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**REPORT ON THE PYCNOGONIDA COLLECTED BY THE SÔYÔ-MARU  
EXPEDITION MADE ON THE CONTINENTAL SHELF BORDERING  
JAPAN DURING THE YEARS 1926-1930<sup>1)</sup>**

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*With 24 Text-figures*

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This paper is the result of an examination of the pycnogonids collected on the continental shelf bordering Japan by the surveying ship Sôyô-maru of the Imperial Fisheries Experimental Station (now the Tôkai Regional Fisheries Research Laboratory) during the years 1926-1930. Its study was originally assigned to Dr. Hiroshi OHSHIMA, then Professor of Zoology in the Kyusyu Imperial University, but after his retirement in 1946 from his teaching duties, was kindly transferred to the writer.

When the material here dealt with was entrusted to my care in 1953, it was found to be all but untouched by Dr. OHSHIMA himself and unfortunately the majority having been badly preserved in tubes, either scarcely filled with alcohol or dried up. Sometimes the legs and other delicate appendages were quite dissolved or damaged, or mostly lost. Yet identification proved to be mostly possible, for, apart from the taxonomically unimportant minor structures, each species possesses some characteristic features of its own.

As the result of an examination it was found that the specimens contained in 41 vials are referable to 24 species, belonging to 11 genera, of which 4 are considered new to science. All these specimens, including the types, are now preserved in the zoological collection of the Seto Marine Biological Laboratory at Sirahama. In the appended tables and chart is given the distribution of all species mentioned.

My special thanks are due to Dr. Hiroshi OHSHIMA for the privilege of studying these precious specimens, and to Prof. Yoshi-kuni HIRAIWA and Dr. Sadayoshi MIYAKE, of the Department of Zoology, Kyusyu University who were kind enough not only to entrust to me this collection, but also for permission to retain them for the Seto Marine Biological Laboratory. Further I wish to acknowledge my great indebtedness to Dr. J. H. STOCK, of the Zoological Museum, Amsterdam, and to Dr. Joel W. HEDGPETH, of the Scripps Institution of Oceanography, La Jolla, California, for help with the literature and many other details relating to the species contained in this work.

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1) Contributions from the Seto Marine Biological Laboratory, No. 267.

Table 1. List of Pycnogonida mentioned in this paper.  
 (\* Hitherto not recorded from Japan)

| Name of the species                      | Depth in m. | Observed outside the Japanese waters |
|--|-------------|--------------------------------------|
| <i>Nymphon grossipes</i> KRØYER          | 43-270      | Arctic-circumpolar                   |
| <i>N. japonicum</i> ORTMANN              | 61-986      | —                                    |
| <i>N. braschnikowi</i> SCHIMKEWITSCH     | 93-628      | —                                    |
| <i>N. kodanii</i> HEDGPETH               | 135-1168    | —                                    |
| <i>N. micropedes</i> HEDGPETH            | 86-909      | —                                    |
| <i>N. ortmanni</i> HELFER                | 108-360     | —                                    |
| * <i>N. stocki</i> n. sp.                | 132-324     | —                                    |
| * <i>N. soyoi</i> n. sp.                 | 188         | —                                    |
| * <i>N. falcatum</i> n. sp.              | 135-421     | —                                    |
| * <i>Parapallene nierstraszi</i> LOMAN   | 0-112       | East Indies, South Africa            |
| <i>Pallenopsis sibogae</i> LOMAN         | 36-162      | East Indies                          |
| <i>Phoxichilidium ungelatum</i> HEDGPETH | 147-1057    | —                                    |
| <i>Achelia superba</i> (LOMAN)           | 36-180      | —                                    |
| <i>Ascorhynchus japonicum</i> IVES       | 100-1652    | —                                    |
| <i>A. cryptopygium</i> ORTMANN           | 108-270     | —                                    |
| <i>A. glabroides</i> ORTMANN             | 72-250      | —                                    |
| <i>A. glaberrimum</i> SCHIMKEWITSCH      | 93          | —                                    |
| <i>Cilunculus armatus</i> (BÖHM)         | 65-628      | Okhotsk Sea                          |
| <i>Heterofragilia amica</i> STOCK        | 162-203     | —                                    |
| * <i>Scipiolus spinosus</i> n. sp.       | 71          | —                                    |
| <i>Colossendeis dofleini</i> LOMAN       | 181-770     | —                                    |
| <i>C. chitinsa</i> HILTON                | 56-770      | Alaska, Bering Sea                   |
| <i>C. nasuta</i> HEDGPETH                | 519-704     | —                                    |
| <i>Pycnogonum tenue</i> (SLATER)         | 61-274      | —                                    |

### Some Zoogeographical Remarks

Our present knowledge on the Japanese pycnogonid fauna is largely due to the works of OHSHIMA (1936 and others), HEDGPETH (1949) and STOCK (1954). Most of the faunal elements elucidated by these eminent workers are confined to rather deep-water forms, since they have dealt with for the most part the collections taken by various foreign expeditions in the Okhotsk and Japanese Seas. Some of the eulittoral and shallow-water forms are found in their works, but most are practically almost unknown, except for the region of Hokkaido once studied by me (UTINOMI, 1954). Hence it is rather risky to draw conclusions from the insufficient material.

OHSHIMA (1936) gave a list of the pycnogonids so far recorded from Japanese and adjacent waters, including the Chinese and Siberian coasts. In that list he enumerated 41 pycnogonids, comprising 34 species, 3 varieties and 4 indeterminate forms. Since then, HEDGPETH (1949) also listed 65 definite species and 6 indeter-

able species or forms, by the acquisition of rich materials collected by the Albatross Expedition in 1900 and 1906. Very recently, STOCK (1954) recorded 30 species from the collection made by Dr. Th. MORTENSEN in the years 1914-1916, including 6 new, 4 unknown and 2 indeterminable species.

The present Sôyô-maru material here dealt with, though not so rich in species as well as specimens, contains 24 species in all. The dredging operations were made by the S. S. Sôyô-maru at 658 stations, ranging between 18 and 799 meters in depth, and the successful catch for pycnogonids ranged from 64 to 539 meters. The pycnogonids were thus collected at about 6.23% of the stations occupied; this percentage of catch is very low, as compared with that taken by the Siboga in East Indies (12.4%) and that taken by the Albatross in Japan (20%).

Summing up all existing records, the Japanese pycnogonid fauna consists of about 22 genera and 99 species to date, not counting any invalid or indeterminable species ever recorded. They are:

|                                 |         |                        |        |
|---------------------------------|---------|------------------------|--------|
| <i>Nymphon</i>                  | 24 spp. | <i>Nymphopsis</i>      | 1 sp.  |
| <i>Callipallene</i>             | 5 spp.  | <i>Ascorhynchus</i>    | 6 spp. |
| <i>Propallene</i>               | 1 sp.   | <i>Cilunculus</i>      | 1 sp.  |
| <i>Parapallene</i>              | 1 sp.   | <i>Lecythorhynchus</i> | 2 spp. |
| <i>Pallenopsis</i>              | 6 spp.  | <i>Heterofragilia</i>  | 1 sp.  |
| <i>Decachela</i>                | 1 sp.   | <i>Scipiolus</i>       | 1 sp.  |
| <i>Phoxichilidium</i> (s. lato) | 6 spp.  | <i>Nymphonella</i>     | 1 sp.  |
| <i>Pycnosoma</i>                | 1 sp.   | <i>Tanystylum</i>      | 2 spp. |
| <i>Endeis</i>                   | 1 sp.   | <i>Austrodecus</i>     | 1 sp.  |
| <i>Achelia</i>                  | 13 spp. | <i>Colossendeis</i>    | 7 spp. |
| <i>Ammothella</i>               | 2 spp.  | <i>Pycnogonum</i>      | 5 spp. |

Among them, about 24 are apparently shallow-water species, and it is expected that future extensive collecting survey specially in southern Japan, will reveal as many more than a rich lot of the species hitherto known.

Against our expectation, the present collection is represented by relatively few of the widely distributed or warm-water species that are known to occur throughout the Indo-West Pacific Region. As seen in Table 1, only two species are common to Japanese waters and the East Indies: *Pallenopsis sibogae* and *Parapallene nierstraszi*. *Pallenopsis mollissima*, *P. tydemani*, *P. virgata*, *P. temperans*, *Ascorhynchus auchenicum*, *Nymphopsis muscosa*, *Callipallene dubiosa* and *Endeis mollis*, all of which are not represented in the Sôyô-maru collection, are also included in the same category.

Apart from the cosmopolitan deep-water genus *Colossendeis*, there is but one common to both faunae, still extending the range of occurrence to South Africa: *Parapallene nierstraszi* (cf. BARNARD, 1954). It is rather strange that the other deep-water genera, such as *Nymphon* and *Ascorhynchus*, are well represented in Japanese waters by a number of endemic species; indeed, all the records taken by the Siboga (1899-1900), the Albatross (1900-1909) and the Snelius Expedition (1929-

1930) in the East Indian and Philippine waters gave no evidence to prove further southward extension of the range of the endemic forms in Japan (LOMAN, 1908; STOCK, 1953b, 1954).

The most noticeable fact, in this connection, is a refind of *Heterofragilia amica* and an occurrence of a new representative of the genus *Scipiolus*, regarded hitherto to be monospecific and endemic to East Indies. It is thus probable that both unique genera are not restricted to either of the two regions, but similar species or allies may also occur in both regions, as in the case of *Cilunculus*.

On the other hand, the boreal species are represented in the present collection by three deep-water species: *Nymphon grossipes*, *N. braschnikowi* and *Colossendeis chitinsa*. *Nymphon kodanii*, *N. micropedes* and *N. ortmanni* have hitherto been known only from Japanese waters south of latitude 36°N, while in the present collection they are recorded from regions north of 36°N. The distribution of *N. japonicum*, of which 33 specimens were captured from 15 stations, is the largest, crossing the boundary of 36°N. From the oceanographical point of view, especially in respect to the circulation of currents around the mainland of Japan, it is not surprising to find some warm-water forms (of course any endemic species as well) in the southern coast of Hokkaido and some cold-water forms in the Korea Strait.

### Systematic Account

#### Family NYMPHONIDAE WILSON

#### Genus *Nymphon* J. O. FABRICIUS

#### 1. *Nymphon grossipes* (O. FABRICIUS ?) KRØYER

(Fig. 1)

*Nymphon grossipes* HEDGPETH, 1948, pp. 187-188, fig. 13a; HEDGPETH, 1949, p. 247 (synonymy).

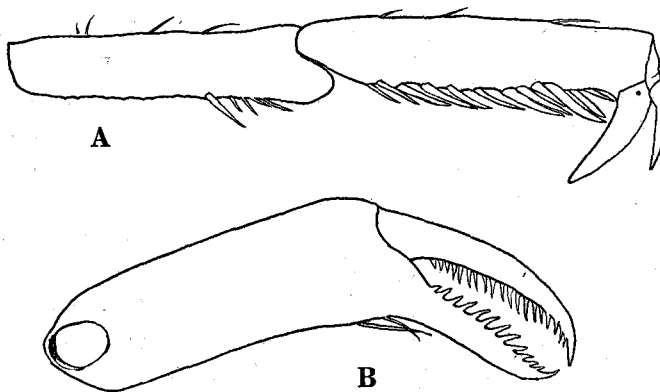


Fig. 1. *Nymphon grossipes* (O. FABRICIUS ?) KRØYER.  
A, distal joints of leg; B, chela. (All  $\times 27$ )

*Material:* 1 larvigerous male (Coll. No. 893)\*, St. 269, off Simoda, Sagami Bay, 247 m. Nov. 18, 1927.

*Remarks:* All characters agree well with previous descriptions of this species, so some measurements are only given herein in mm.

|                          |      |                               |     |
|--------------------------|------|-------------------------------|-----|
| Length of proboscis..... | 0.4  | Cephalic segment.....         | 5.5 |
| Length of trunk .....    | 10.0 | Chela .....                   | 3.0 |
| Length of abdomen .....  | 1.5  | Width across 2nd crurigers... | 3.0 |

This boreal Arctic species is hitherto known from the Siberian coast and Okhotsk Sea, north of 43°N. in the Northwestern Pacific, and from New England waters, north of 40°N. in the North Atlantic. Hence, this record extends the distributional range to the south of 35°N. Bottom temperature of the locality was 11.2°C.

## 2. *Nymphon japonicum* ORTMANN

*Nymphon japonicum* ORTMANN, 1891, pp. 158-159, Pl. 24 fig. 1; HEDGPETH, 1949, pp. 249-250, fig. 20; UTINOMI, 1951, pp. 159-160; STOCK, 1954, pp. 18-20, fig. 6a-c.

*Material:* 1 male (Coll. No. 920), St. 232, Tosabaé, SE. of Muroto-zaki, 269 m. July 30, 1927.

1 female and 1 ovigerous male, both red colored (Coll. No. 889), St. 239, off Misaki, Sagami Bay, 307 m. Nov. 6, 1927.

1 female (Coll. No. 890), St. 255, off Inatori, Sagami Bay, 263 m. Nov. 10, 1927.

3 specimens (Coll. No. 891), St. 258, off Irô-zaki, Suruga Bay, 432 m. Nov. 15, 1927.

1 specimen, dark brown in color (Coll. No. 892), St. 259, Suruga Bay, 188 m. Nov. 15, 1927.

1 juvenile, probably this species (Coll. No. 894), St. 270, Dôketuba, Sagami Bay, 91 m. Nov. 18, 1927.

1 female (Coll. No. 895), St. 279, Seno-umi, Suruga Bay, 155 m. July 2, 1928.

3 specimens, almost mutilated (Coll. No. 346), St. 286, Seno-umi, Suruga Bay, 123 m. July 4, 1928.

5 specimens, not fully matured (Coll. No. 365), St. 293, off Sata-misaki, Kagosima Pref., 203 m. July 10, 1928.

1 specimen, legs only remained (Coll. No. 907), St. 553, off Komatu, Isikawa Pref., 113 m. July 21, 1930.

1 male and 1 ovigerous male (Coll. No. 909), St. 568, N. of Noto Peninsula, 90 m. July 27, 1930.

3 specimens lacking the terminal segments, trunk damaged, but probably this species (Coll. No. 910), St. 575, N. of Noto Peninsula, 123 m. July 28, 1930.

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\* Collection Number (Coll. No.) refers to the labels originally contained in the vials of the Sôyô-maru Collection.

2 specimens (Coll. No. 918), St. 610, NE. of Sado Island, 145 m. Aug. 10, 1930.

3 ovigerous males (Coll. No. 919), St. 618, S. of Tobi-sima, Yamagata Pref., 135 m. Aug. 14, 1930.

4 specimens, damaged (Coll. No. 922), St. 638, Nisitugaru Bank, Aomori Pref., 73 m. Aug. 18, 1930.

*Remarks:* This species is very common and apparently endemic in the Japanese waters, as collected at 15 stations during the Sôyô-maru Expedition, 9 on the Pacific coast and 6 in the Japan Sea.

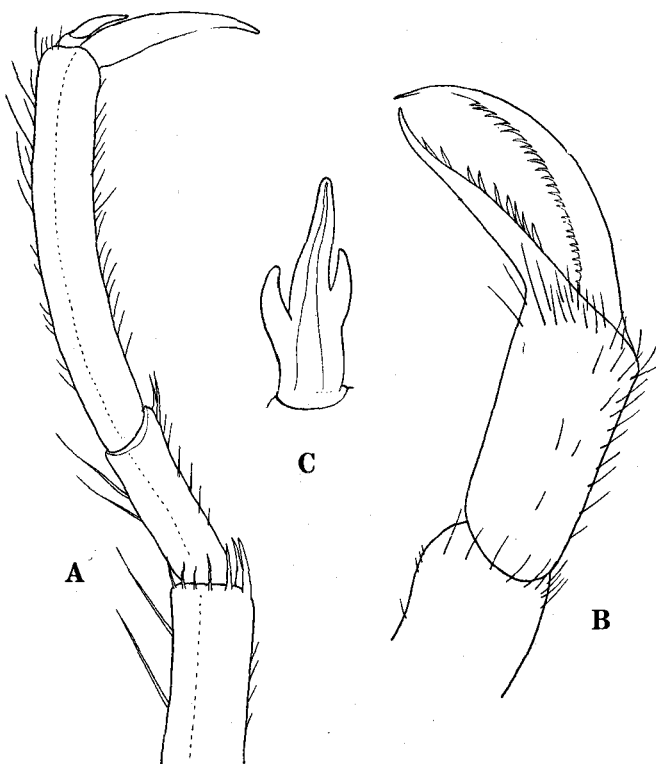


Fig. 2. *Nymphon braschnikowi* SCHIMKEWITSCH.  
A, distal joints of leg; B, chela; C, compound spine of oviger.

### 3. *Nymphon braschnikowi* SCHIMKEWITSCH

(Fig. 2)

*Nymphon braschnikowi* SCHIMKEWITSCH, 1906, pp. 248-251; SCHIMKEWITSCH, 1930, pp. 507-512, figs. 154-160, Pl. IX figs. 1-2; OHSHIMA, 1936, p. 863 (listed); HEDGPETH, 1949, p. 250, fig. 21a-c.

*Material:* 1 ovigerous male (Coll. No. 879), St. 57, off Miyako, Iwate Pref., 494 m. July 18, 1926.

*Remarks:* The specimen is referable to this species, described only by two authors. The chelae and the terminal joints of legs resemble those figured by HEDGPETH rather than those of the type. According to the original description, the spine formula of the oviger joints is 7-8:5:5:6::6 and their compound spines are armed with 3 pairs of denticulations. In the present specimen, however, the spine formula is 7:5:4:5::10 and each spine possesses only one pair of denticulations.

The "Albatross" record of occurrence of this species is not as far south as 42°N. The present record (39°44'36" N.) extends its range farther southwards.

*Measurements of a male (in mm)*

|                          |     |                   |     |
|--------------------------|-----|-------------------|-----|
| Length of proboscis..... | 1.8 | femur .....       | 5.0 |
| Length of trunk .....    | 5.5 | tibia 1 .....     | 5.0 |
| Length of abdomen.....   | 1.5 | tibia 2 .....     | 7.5 |
| Third leg:               |     | tarsus .....      | 1.0 |
| coxa 1 .....             | 1.0 | propodus .....    | 2.3 |
| coxa 2 .....             | 3.0 | claw .....        | 1.0 |
| coxa 3 .....             | 1.0 | auxiliaries ..... | 0.3 |

#### 4. *Nymphon kodanii* HEDGPETH

(Fig. 3)

*Nymphon kodanii* HEDGPETH, 1949, pp. 252-254, fig. 23; STOCK, 1954, p. 21, fig. 6f.

*Material:* 1 larvigerous male (Coll. No. 921), St. 630, off Oga Peninsula, Akita Pref., 150 m. Aug. 17, 1930.

*Remarks:* This species is characterized by the shape of chela, the fourth joint of palp which is shorter than the fifth and the very setose legs, but the relative length of the joints of legs and the setation of the trunk and legs may be subject to considerable variation.

In the present specimen, all legs are very setose and the median joints are comparatively longer than in HEDGPETH's specimens, as shown by the measurement given below. Tarsus and propodus are considerably shorter than the tibiae and with a row of densely-set spines on the ventral surface and also with a row of moderately spaced spines on the lateral surfaces. Terminal claw slightly curved, about two-thirds as long as propodus. Auxiliaries about half as long as terminal claw.

Oviger situated in front of the base of first crurigers and with compound spines, each bearing 2 pairs of denticulations, arranged as follows:—12:8:8:8::7.

Chela, a little longer than scape, slightly setose on outer surface and incurved at the base of finger; palm and fingers subequal in length, fingers slender, strongly crossing at tips and armed with about 24-31 denticulations on the immovable finger and about 40 on the movable finger. The number of denticulations in the fingers is larger than the original description indicates, but the remaining characters may prove to be identical.



Previously recorded only from Japan (33°23' N., 135°34'–37' E., 544–649 fathoms—Kii Channel; 33°41' N., 128°50' E., 75 fathoms—Tusima Strait).

*Measurements of a male (in mm)*

|                                  |     |                   |      |
|----------------------------------|-----|-------------------|------|
| Length of proboscis .....        | 3.5 | Fourth leg:       |      |
| Length of trunk .....            | 8.5 | coxa 1 .....      | 1.5  |
| Width across 2nd crurigers ..... | 4.0 | coxa 2 .....      | 4.0  |
| Length of abdomen .....          | 1.5 | coxa 3 .....      | 1.8  |
| Length of palp .....             | 6.8 | femur .....       | 11.0 |
| Length of scape .....            | 3.5 | tibia 1 .....     | 15.0 |
| Length of chela .....            | 5.5 | tibia 2 .....     | 23.0 |
|                                  |     | tarsus .....      | 1.3  |
|                                  |     | propodus .....    | 1.5  |
|                                  |     | claw .....        | 0.5  |
|                                  |     | auxiliaries ..... | 0.25 |

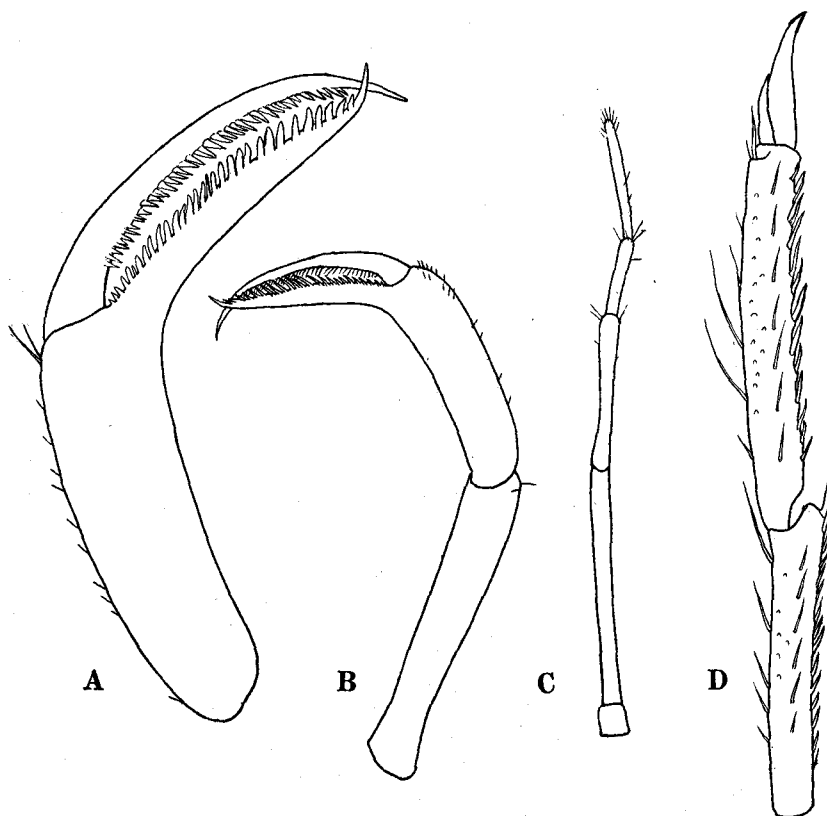


Fig. 3. *Nymphon kodanii* HEDGPETH.  
A, chela; B, chelifore; C, palp; D, distal joints of leg.  
(B, C,  $\times 11$ ; A,  $\times 21$ ; D,  $\times 33$ )

5. *Nymphon micropedes* HEDGPETH

(Fig. 4)

*Nymphon micropedes* HEDGPETH, 1949, pp. 254-256, fig. 24.

*N. japonicum* KISHIDA (non ORTMANN), 1927, p. 990, fig. 1907; OHSHIMA and KISHIDA, 1947, p. 1007, fig. 2857 (reproduced).

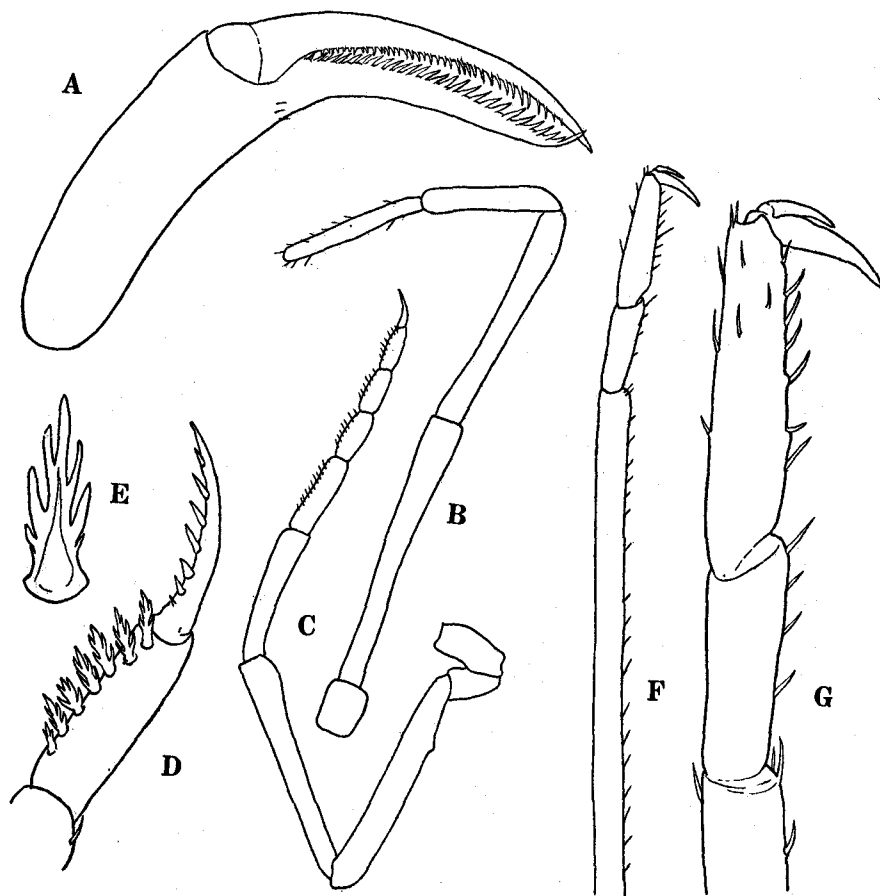


Fig. 4. *Nymphon micropedes* HEDGPETH.

A, chela; B, palp; C, oviger; D, distal joints of oviger; E, compound spine of oviger; F, distal joints of leg; G, tip of the same, enlarged. (C,  $\times 11$ ; F,  $\times 21$ ; A, B,  $\times 27$ ; D, G,  $\times 53$ ; E,  $\times 150$ )

**Material:** 3 specimens (Coll. No. 924), St. 645, W. of Tugaru Strait, 115 m. Aug. 22, 1930.

2 specimens (Coll. No. 945), St. 647, W. of Tugaru Strait, 85 m. Aug. 23, 1930.

1 male (Coll. No. 472), St. 658, Tugaru Strait, 113 m. Aug. 30, 1930.

*Remarks:* All the specimens collected from the Tugaru Strait agree well with HEDGPETH's *N. micropedes*, which is principally characterized by the very short tarsus and propodus and also the large chelae with slender, moderately straight fingers. HEDGPETH denied the presence of eyes, but as illustrated by KISHIDA, they are distinct on a low round ocular tubercle, though not heavily pigmented. He further mentions: "the bases of the ovigers near the anterior end just beyond the origin of the scape." This is undoubtedly not true. In fact, the base of oviger is well separated from the first crurigers and occupies the posterior one-third of the neck behind the anterior cephalic expansion. Spine formula of oviger joints is 10:7:6:7::7.

This species is undoubtedly very close to the preceding species, especially in the shape of chelae and the oviger, the relative length of the joints of legs and the terminal and auxiliary claws. The noteworthy differences between *N. micropedes* and *N. kodanii* are: (1) the chela of *micropedes* has slenderer fingers, longer than palm, (2) the legs in the former are not so setose as in the latter, bearing a row of widely-spaced fine setae on the ventral surface only, (3) the fourth and fifth joints of palp in *micropedes* are subequal, but together shorter than the third, (4) the fifth joint of oviger in *micropedes* is slightly expanded distally.

## 6. *Nymphon ortmanni* HELFER

(Fig. 5)

*Nymphon japonicum* LOMAN (*non* ORTMANN, after HELFER 1938), 1911, p. 8 (part).

*N. ortmanni* HELFER, 1938, pp. 164-167, fig. 1; STOCK, 1953a, pp. 34-36, fig. 1; STOCK, 1954, pp. 20-21, fig. 6d-e.

*Material:* 1 specimen (Coll. No. 927), St. 653, Tugaru Strait, 108 m. Aug. 24, 1930.

*Remarks:* This species as redescribed and confirmed by STOCK is characterized by the extremely small auxiliaries and the main claw more than half as long as the propodus. The propodus is slightly longer than the tarsus, as in the type, both bearing thickly set smaller setae on sole and a few longer ones on the other side.

## 7. *Nymphon stocki* n. sp.

(Figs. 6 and 7)

*Material:* 1 specimen (Coll. No. 898—S.M.B.L. Type 157), St. 435, S. of Gotô Islands, 324 m. July 18, 1929.

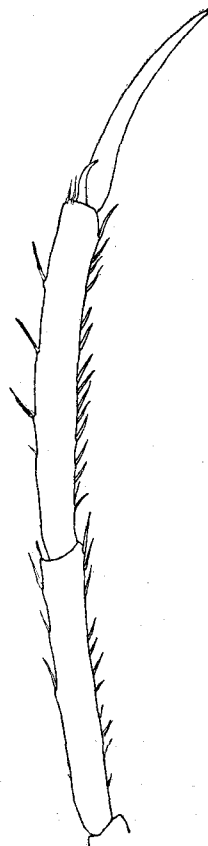


Fig. 5. *Nymphon ortmanni* HELFER.  
Distal joints of leg.  
( $\times 33$ )

1 specimen (Coll. No. 905—Paratype), St. 572, N. of Noto Peninsula, 132 m. July 27, 1930.

*Description:* Trunk moderately slender, completely segmented. Neck of medium length, not greatly expanded at base of chelifores, cephalic segment subequal to the rest of trunk. Oviger implantation lying on each side (not ventrally) well separated from first crurigers, and occupying the posterior one-third of the neck behind the anterior cephalic expansion. Crurigers slightly longer than wide, separated by about

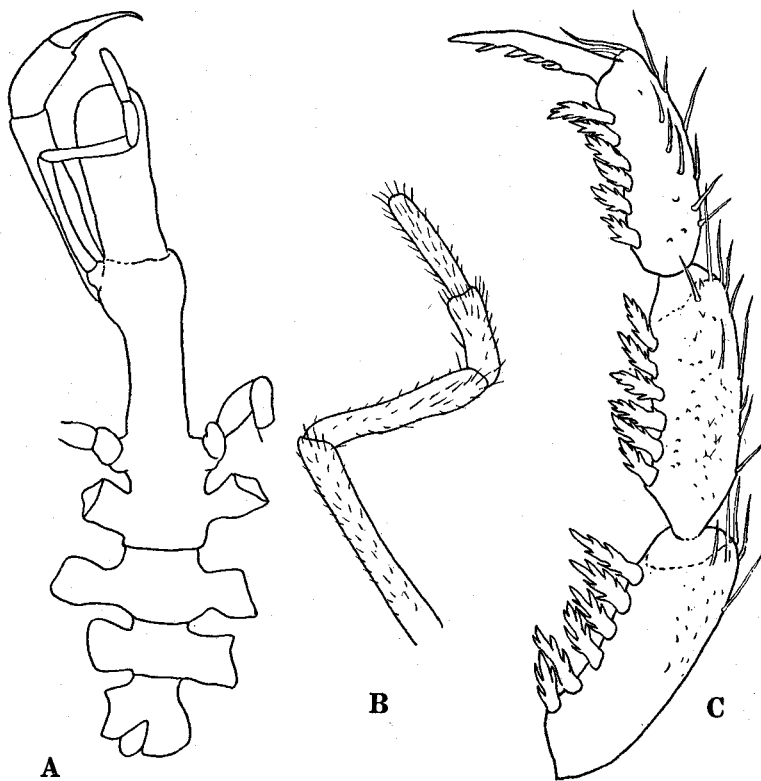


Fig. 6. *Nymphon stocki* n. sp.

A, ventral view of holotype, legs omitted; B, palp; C, distal joints of oviger (from paratype). (A,  $\times 11$ ; B,  $\times 27$ ; C,  $\times 67$ )

half of their own diameter, their length subequal to median width of segments or less. Proboscis round at tip, nearly cylindrical, about as wide as neck and its length subequal to neck in front of the oviger implantation. Eye tubercle low, rounded at tip, with large eyes not heavily pigmented. Abdomen small, not extending beyond last crurigers, clavate, directed at an angle of about  $50^\circ$ . All surface of body and appendages (proboscis too) wholly covered with peculiar forked hairs.

Chelifore with scape as long as proboscis; chelae about as long as scape, with

short fingers. Fingers about as long as palm, armed with 17-21 large well-separated teeth on immovable finger and 20-31 on dactylus. Scape and palm heavily setose and hairy; fingers glabrous.

Palp slender, setose throughout, second joint about two-thirds as long as proboscis, third joint a trifle shorter than second, fourth joint shorter than fifth; the distal two joints together longer than third.

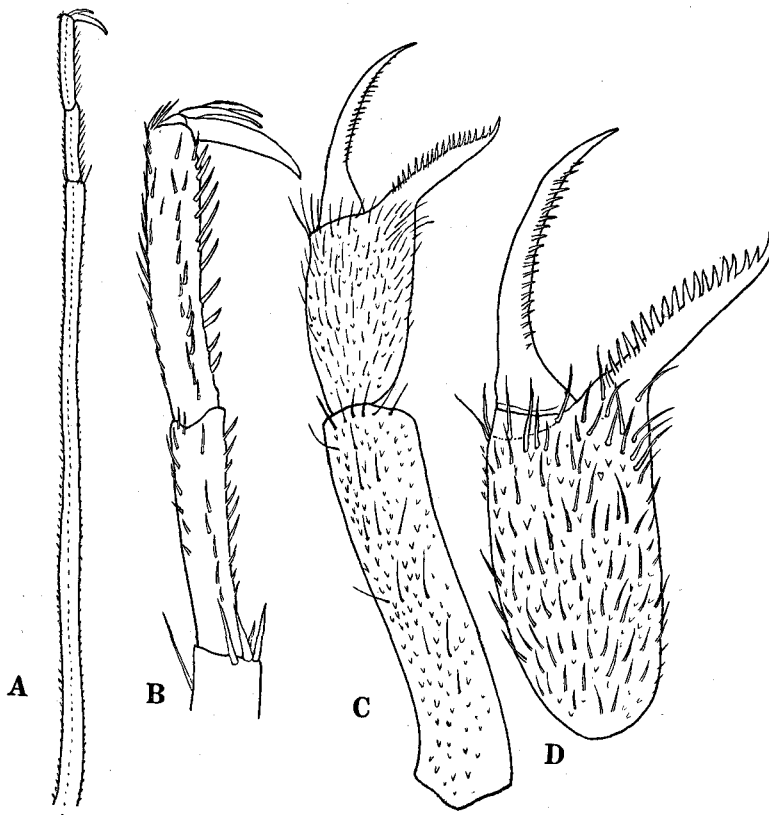


Fig. 7. *Nymphon stocki* n. sp.

A, distal joints of leg; B, tip of the same, enlarged;  
C, chelifore; D, chela, (A,  $\times 11$ ; C,  $\times 21$ ; B, D,  $\times 33$ )

Oviger 10-jointed, moderately slender; first joint very short, second and third about equal and a little longer than first. Distal 4 joints hairy, armed with stiff setae on the outer side and a row of compound spines with pairs of 2-3 denticulations on the inner side. Terminal claw fairly straight, about three-fourths as long as the last joint, and armed with 4 well-spaced spines. Spine formula in the holotype is 7:8:6:5::4, while in the paratype 10:6:6:6::4.

Legs heavily setose, being armed with 4 longitudinal rows of short setae from

tibiae to propodus, besides forked hairs scattered. It is to be regretted that there has been found no perfect leg with all joints. But, tibia 2 is extremely long and slender, approximately seven times as long as the sum of tarsus and propodus. Propodus slightly longer than tarsus and armed with 12-13 subequal setae on sole which are somewhat larger than those of lateral and dorsal rows. Terminal claw slightly curved, a little shorter than half of propodus and less than twice as long as auxiliaries.

*Measurements of the holotype (in mm)*

|                              |     |                   |      |
|------------------------------|-----|-------------------|------|
| Length of proboscis .....    | 2.0 | coxa 3 .....      | 2.5  |
| Length of trunk .....        | 5.0 | femur .....       | 7.0  |
| Length of abdomen .....      | 0.8 | tibia 1 .....     | 8.5  |
| Length of chelore .....      | 4.0 | tibia 2 .....     | 15.0 |
| Length of 2nd cruriger ..... | 1.0 | tarsus .....      | 0.8  |
| A leg detached from body:    |     | propodus .....    | 1.3  |
| coxa 1 .....                 | 0.8 | claw .....        | 0.6  |
| coxa 2 .....                 | 1.0 | auxiliaries ..... | 0.34 |

*Remarks:* This species somewhat resembles *Nymphon benthos* HEDGPETH (1949) from Japanese waters, *N. pixellae* SCOTT (= *N. solitarium* EXLINE) from Pacific coast of North America (HILTON, 1942) and *N. arabicum* CALMAN (1938) from South Arabian coast in the general feature. It is, however, different from them, in particular by the well-separated oviger implantation from the first crurigers, the shorter chelae, the shorter crurigers and abdomen, the longer auxiliary claws and the peculiar hairy investiture covering the body and appendages.

This interesting new species is named for Dr. J. H. STOCK, of the Zoological Museum, Amsterdam, in recognition of his excellent contribution to the study of Japanese pycnogonids based on Dr. Th. MORTENSEN's collection.

8. *Nymphon soyoi* n. sp.

(Fig. 8)

*Material:* 1 female (Coll. No. ?—S.M.B.L. Type 158), St. 558, W. of Noto Peninsula, 188 m. July 22, 1930.

*Description:* Trunk moderately stout, anterior end broadly expanded at chelifore bases. Neck short, about half as wide as anterior cephalic expansion, distinctly constricted in front of base of ovigers lying ventrally. Crurigers about twice as long as wide, separated by less than their own diameter. Eye tubercle higher than wide, slightly pointed at tip, eyes distinct.

Proboscis stout, truncate at end, expanded about halfway; its length nearly equal to that of cephalic segment in front of eye tubercle and its diameter distinctly larger than that of neck. Abdomen distinctly longer than last crurigers, clavate and nearly horizontal. Glabrous.

Chelifore: scape joints missing. Chela long, slender, with curved fingers, deeply

crossing at tip. Fingers longer than palm, armed with 20-21 large teeth on immovable finger and 30 slender teeth on movable finger.

Palp long, slender, second joint a little shorter than proboscis, third joint less than half as long as second; fourth and fifth joints subequal, the two together about two-thirds as long as second. Terminal joints armed with fine setae.

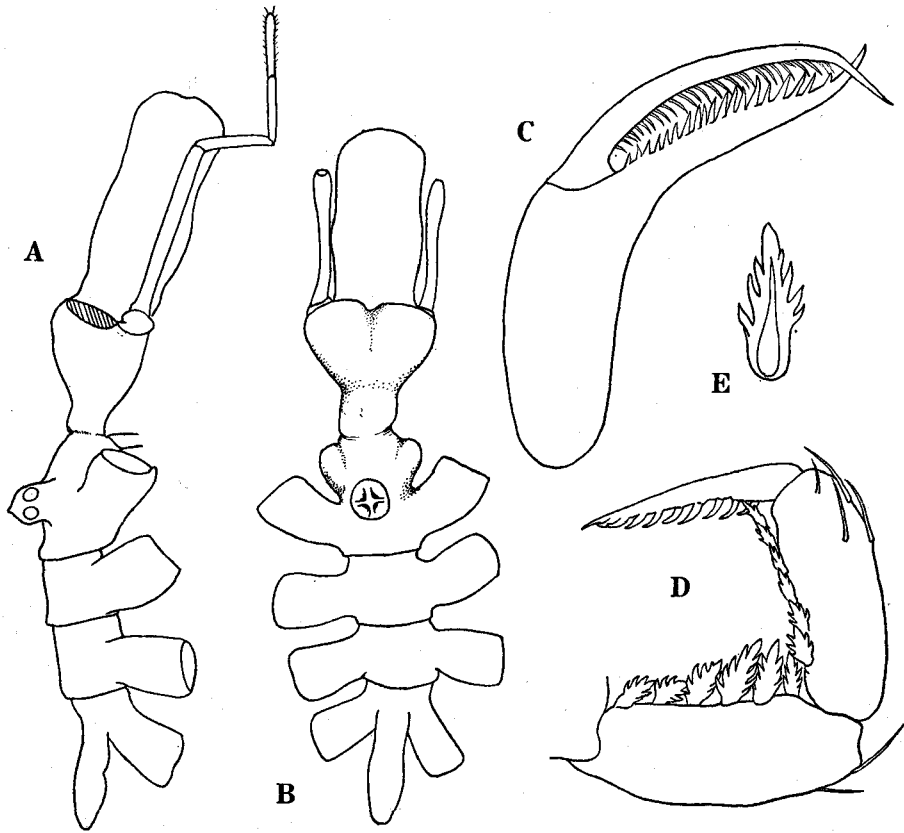


Fig. 8. *Nymphon soyoi* n. sp.

A, lateral view of female holotype, legs omitted; B, dorsal view of trunk; C, chela; D, distal joints of oviger; E, compound spine of oviger.  
(A, B,  $\times 11$ ; C,  $\times 27$ ; D,  $\times 33$ ; E,  $\times 150$ )

Oviger with subequal distal joints, each bearing a few setae on outer surface and compound spines with 2-4 pairs of coarse denticulations on inner surface. Spine formula is 8:7:6:6::9. Terminal claw straight, with 7 recurved spines on inner margin.

Legs cannot be accurately observed, all joints being detached off. Distal joints including claws missing.

## Measurements of the holotype (in mm)

|                                |     |               |      |
|--------------------------------|-----|---------------|------|
| Length of proboscis .....      | 2.6 | Legs :        |      |
| Diameter of proboscis.....     | 1.0 | coxa 1 .....  | 1.0  |
| Length of trunk .....          | 4.3 | coxa 2 .....  | 2.5  |
| Width across 2nd crurigers ... | 2.6 | coxa 3 .....  | 1.5  |
| Length of abdomen.....         | 1.3 | femur .....   | 6.5  |
| Length of chela in situ .....  | 3.3 | tibia 1 ..... | 10.0 |
| Length of palm.....            | 1.8 | tibia 2 ..... | 12.0 |
| Length of finger .....         | 2.0 |               |      |

*Remarks:* Although the specimen is not complete, lacking the distal joints of legs, this species cannot be referred to any known species of the genus *Nymphon* in respect to the distinct constriction in the neck and the combination of other characters described above.

9. *Nymphon falcatum* n. sp.

(Fig. 9)

*Material:* 1 female (Coll. No. 896—S.M.B.L. Holotype 159) and 3, including ovigerous male and female (Coll. No. 896—S.M.B.L. Paratypes), St. 315, off Mimitu, Miyazaki Pref., 421 m. July 15, 1928.

*Description:* Trunk extremely slender, elongate, distinctly segmented. Crurigers also very slender, elongate, widely separated by two or three times of their own diameter; its length about thrice of its own diameter in the first to third crurigers, while about twice in the last one. Cephalic segment about three-fourths as long as the sum of the three posterior segments; neck long, slender, at base of chelifores greatly enlarged. Base of oviger in contact with first crurigers. Eye tubercle low, rounded at tip, situated on trunk at the base of first crurigers; eyes small but distinct. Proboscis rather heavy, rounded at tip, shorter but wider than neck. Abdomen clavate, long, about 1.5 times as long as the last crurigers. Setae apparently absent.

Chelifore: scape directed outwards at an angle of  $50^{\circ}$ , much longer than proboscis. Chela strongly curved inwards, slender, much longer than scape and articulating in situ with scape at an angle of about  $110^{\circ}$ . Fingers slender, about 1.5 times as long as palm, armed with small teeth which are the longest in the middle, 28 on immovable finger and 18–20 on movable finger.

Palp slender, about 6 mm long in the holotype, second joint the longest, its end reaching the anterior end of proboscis. Fourth joint slightly shorter than second; third and fifth joints subequal and slightly shorter than fourth. Distal two joints hairy.

Oviger 10-jointed, fourth joint more than twice as long as third, slightly curved, with a slight projection at the proximal third on the outer side, fifth joint nearly



straight, a little longer than fourth, slightly expanded distally.<sup>1)</sup> Compound spines of terminal joints very minute, with 2 or 3 pairs of denticulations. Spine formula in seventh to ninth joints is 4:4:3, distal ones being missing.<sup>2)</sup>

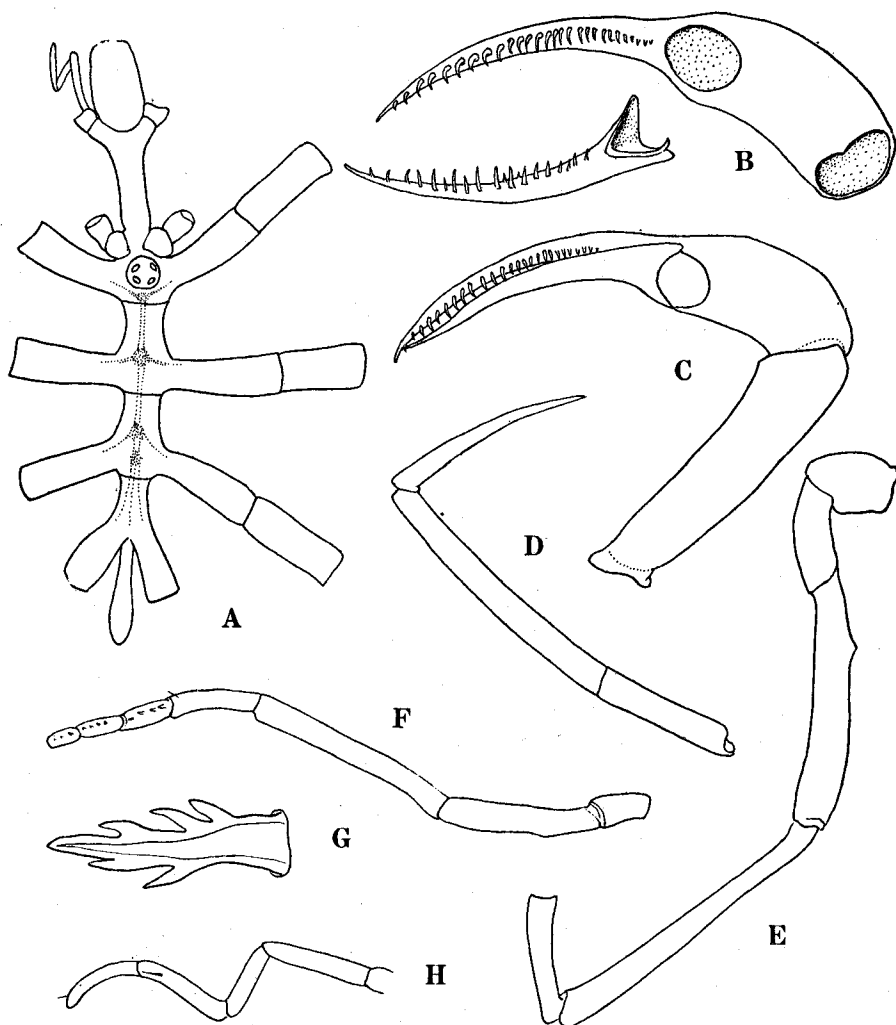


Fig. 9. *Nymphon falcatum* n. sp.

A, dorsal view of female holotype, legs omitted; B, chela; C, chelifore; D, distal joints of leg; E, proximal joints of male oviger; F, female oviger, terminal joint and claw missing; G, compound spine of female oviger; H, palp.  
(A,  $\times 11$ ; C-F, H,  $\times 21$ ; B,  $\times 33$ ; G,  $\times 413$ )

- 1) According to STOCK's personal communication (Apr. 14, 1955), the 5th joint of a male oviger is extremely long, about twice as long as the 4th, and furnished with a distal apophysis, which may be a characteristic of this species.
- 2) According to STOCK, spine formula in a male oviger in his material is 5:4:4:5::6.

Legs long, slender, apparently glabrous. Coxa 1 and 3 subequal, about twice as long as wide. Tibia 2 the longest, nearly as long as the sum of femur and tibia. Tarsus the shortest, slightly longer than half of propodus. Propodus also slender and straight, without setae. Terminal claw shorter than propodus, and longer than tarsus, slightly curved, falciform. No auxiliaries.

Measurements of four specimens (in mm)

|                              | Holotype | Paratype A | Paratype B | Paratype C |
|------------------------------|----------|------------|------------|------------|
| Length of proboscis.....     | 1.0      | 1.5        | 1.0        | 1.3        |
| Length of neck.....          | 1.0      | 1.35       | 1.4        | 1.0        |
| Length of trunk              |          |            |            |            |
| (excluding neck portion) ... | 2.9      | 3.8        | 3.5        | 3.0        |
| Length of abdomen.....       | 0.9      | 1.2        | 1.2        | 1.2        |
| Interval between             |          |            |            |            |
| 1st and 2nd crurigers.....   | 0.6      | 0.7        | 0.8        | 0.6        |
| Length of 2nd cruriger ..... | 0.8      | 1.2        | 1.2        | 0.9        |
| Width of trunk between       |          |            |            |            |
| 1st and 2nd crurigers.....   | 0.3      | 0.45       | 0.4        | 0.35       |
| Third leg:                   |          |            |            |            |
| Coxa 1.....                  | 1.2      | 1.0        |            |            |
| Coxa 2.....                  | 2.0      | 1.5        |            |            |
| Coxa 3.....                  | 0.9      | 0.8        |            |            |
| Femur .....                  | 3.3      | 3.3        |            |            |
| Tibia 1.....                 | 4.5      | 4.5        |            |            |
| Tibia 2.....                 | 10.0     | 7.8        |            |            |
| Tarsus .....                 | 0.8      |            |            |            |
| Propodus .....               | 1.7      |            |            |            |
| Claw .....                   | 1.35     |            |            |            |

*Remarks:* This species is most closely allied to *Nymphon hedgpethi* STOCK (1955 b) from Albatross Station 5348 (NW. of Palawan Island, Philippines, 375 fathoms) in the considerable slenderness of the trunk, the short proboscis and the large chelifores. It differs, however, from *N. hedgpethi* and its allies (such as *N. profundum* HILTON, *N. hamatum* HOEK, etc.) in the presence of eye tubercle, the absence of distal setae on the crurigers, and the relative length of the distal joints of legs.

The trivial name (*falcatum*) here proposed refers to the shape of the terminal claw of the legs.

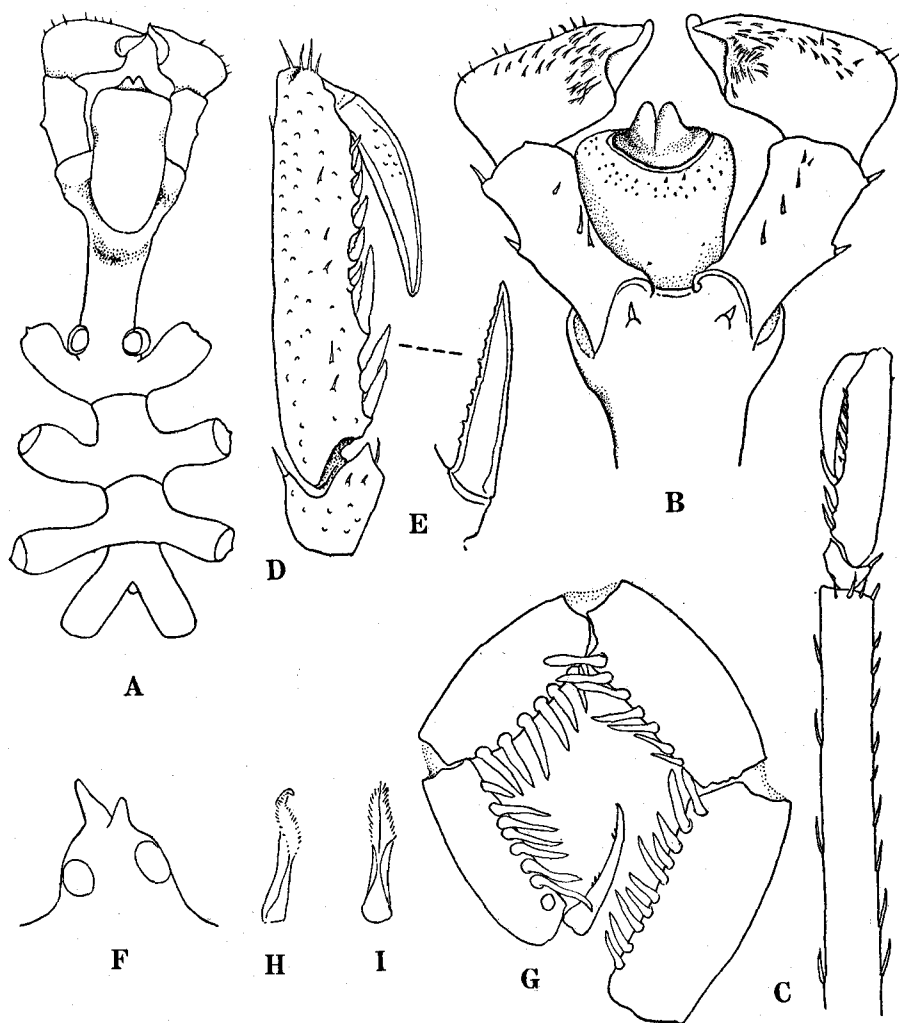
Dr. J. H. STOCK has kindly informed me that an apparently similar form to this proposed new species is included in the collection of Dr. TH. MORTENSEN'S Pacific Expedition, though not described as yet in his first paper dealt with the pycnogonids from the Indo-West Pacific region. The locality where his specimen was obtained is, according to him, 33°41' N., 128°50' E. (Tusima Strait), 75 fathoms.

## Family CALLIPALLENIDAE HILTON

(=Pallenidae auct.)

Genus *Parapallene* CARPENTER11. *Parapallene nierstraszi* LOMAN

(Fig. 10)

Fig. 10. *Parapallene nierstraszi* LOMAN.

A, ventral view of trunk, legs omitted; B, dorsal view of the anterior part of body; C, distal joints of leg; D, end of leg; E, propodal spine; F, eye tubercle, seen from behind; G, distal joints of oviger; H-I, oviger spines. (A,  $\times 11$ ; C,  $\times 18$ ; B,  $\times 21$ ; D, F,  $\times 33$ ; G,  $\times 53$ ; E,  $\times 97$ ; H, I,  $\times 150$ )

*Parapallene nierstraszi* LOMAN, 1908, pp. 44-45, Pl. IX figs. 122-127; FLYNN, 1928, p. 18; CALMAN, 1938, pp. 158-159, fig. 7; BARNARD, 1954, p. 113; STOCK, 1954, p. 52, fig. 24f.

*Material*: 1 female (Coll. No. 899), St. 468, E. of Tusima, Tusima Strait, 112 m. July 25, 1928.

*Remarks*: The present material agrees in all essentials with LOMAN's type, but the neck is not so elongately slender and lacks the constriction in front of the oviger implantation.

The setation on the scape of chelifores and its base is noticeable as indicated in Fig. 10B; this feature is not met with in previous descriptions. The spination of the crurigers and legs is not marked, only bearing a slight conical elevation on the dorso-distal end of crurigers and coxa 1.

The eye tubercle is bifurcated at tip, with two asymmetrical conical processes. The proboscis is narrowed in the middle and provided at the tip with a large mouth and two distinct oral lips.

Up to now, this species was not recorded from Japanese waters.

*Measurements of a female (in mm)*

|                             |      |                |      |
|-----------------------------|------|----------------|------|
| Length of proboscis .....   | 1.2  | A leg :        |      |
| Diameter of proboscis.....  | 0.88 | coxa 1 .....   | 0.9  |
| Length of trunk .....       | 3.8  | coxa 2 .....   | 2.4  |
| Width of trunk              |      | coxa 3 .....   | 1.0  |
| (excluding crurigers) ..... | 0.6  | femur .....    | 5.6  |
| Length of crurigers.....    | 1.0  | tibia 1 .....  | 6.0  |
| Length of scape .....       | 1.2  | tibia 2 .....  | 10.0 |
| Length of chela .....       | 1.2  | tarsus .....   | 0.4  |
|                             |      | propodus ..... | 1.6  |
|                             |      | claw .....     | 0.76 |

Genus *Pallenopsis* WILSON

12. *Pallenopsis sibogae* LOMAN

(Fig. 11)

*Pallenopsis plumipes* LOMAN (*non* MEINERT) 1908, pp. 66-67, Pl. XII figs. 160-164.  
*P. sibogae* LOMAN, 1911, p. 14; STOCK, 1954, pp. 63-64, fig. 30 h-i.

*Material*: 1 male (Coll. No. 340), St. 278, Suruga Bay, 79 m. July 2, 1928.

*Remarks*: This is a second record of the species from Japan. Hitherto records in the East Indian waters are from Kwandang Bay, North Celebes and from Jolo, Philippines, and in Japan from west of Kyusyu.

As was noticed by STOCK, the male is more hairy than the female, the legs being provided with feathered long setae grouped together distally or medially. Tibia 2 is the longest of all joints, slender and bears fairly simple setae all throughout. A long, tube-like duct of cement gland exists in the middle of the ventral surface of

the femur. The distal end of both the femur and tibia 1 is not so markedly protruded as in the female (figured by LOMAN). Propodus is long and only slightly curved, though not so strongly as STOCK indicates. Genital pores situated on a low distal spur of coxa 2 in the posterior 2 pairs of legs.

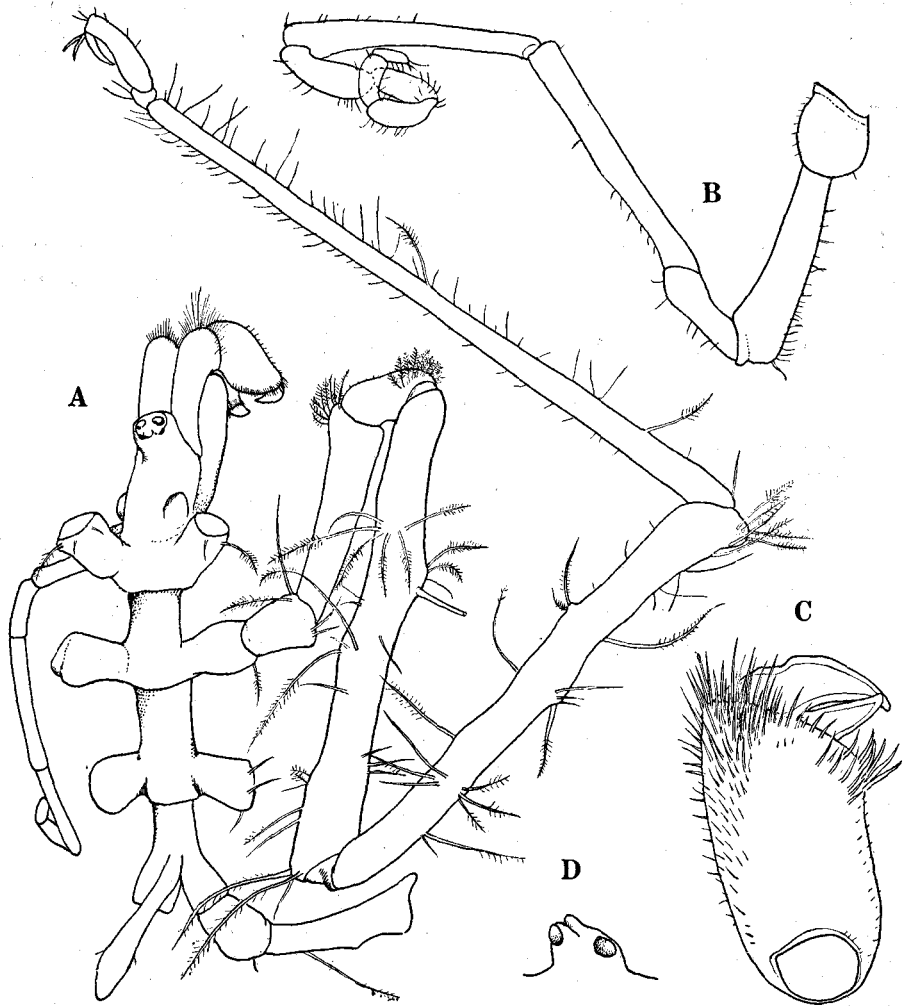


Fig. 11. *Pallenopsis sibogae* LOMAN.

A, dorsal view of trunk, showing 2nd leg on the right side and an oviger on the left; B, male oviger; C, chela; D, eye tubercle, seen from the right. (A,  $\times 11$ ; B,  $\times 21$ ; C,  $\times 67$ )

The eye tubercle seems to be characteristic. It is wider than high and tipped with two small processes posteriorly; the anterior eyes are distinctly larger than the posterior pair situated on the outer side of processes.

## Measurements of a male (in mm)

|                           |     |                   |     |
|---------------------------|-----|-------------------|-----|
| Length of proboscis ..... | 2.0 | Fourth leg :      |     |
| Length of trunk .....     | 6.0 | coxa 1 .....      | 0.6 |
| Length of abdomen .....   | 2.0 | coxa 3 .....      | 2.5 |
| Length of crurigers ..... | 0.8 | femur .....       | 5.5 |
| Length of scape .....     | 1.5 | tibia 1 .....     | 6.0 |
| Length of chela .....     | 1.2 | tibia 2 .....     | 8.0 |
|                           |     | tarsus .....      | 0.3 |
|                           |     | propodus .....    | 1.2 |
|                           |     | claw .....        | 0.6 |
|                           |     | auxiliaries ..... | 0.4 |

## Family PHOXICHILIDIIDAE G. O. SARS

As I have already criticized, the generic distinction between the genera *Phoxichilidium*, *Anoplodactylus* and *Halosoma* is almost untenable. But I have stated that a combination of morphological characters and habitats (as to whether living in shallow or deep waters) would become the separation of this troublesome group more natural (UTINOMI, 1954).

The hitherto generally admitted generic characters for separating *Anoplodactylus* from *Phoxichilidium* are diversified among taxonomists. Such characters as the forward-extending cephalic segment and the reduction or absence of auxiliary claws, by which most of the earlier authors assigned to, are not definitely recognized in some of the species of *Anoplodactylus* to which they are assigned. The same may be said also for the relation between the number of oviger joints and the development of auxiliary claws. And the two above-mentioned characters are not always combined together in each of the species.

Another reliable criterion which I have suggested is the relative length between the second and third joints of the oviger. This character seems to be combined with the contour of body (robust or slender) as well as the habitat to a certain degree. In other respects, however, it is not true. All attempts to define the two or three genera, mainly based on the relative length of different joints and claws, fail, as the number of new species increases in the future.

After long consideration, now I arrived at a conclusion that it would be highly natural to keep them all in one genus to avoid further confusion. Indeed, Dr. Joel W. HEDGPETH says that "It may not be long before some bold person decided to lump them together" (Personal communication!). If dividing and re-grouping of this family is to be retained as a matter of convenience, a further and more detailed search for other distinctive characters (e.g. the papillae-bearing proboscis, the propodal cutting lamina, the arrangement of femoral cement glands, etc.), which have been regarded only as of specific importance, should be needed.

Genus *Phoxichilidium* H. MILNE-EDWARDS  
(Including *Anoplodactylus* and *Halosoma*)

13. *Phoxichilidium ungelatum* HEDGPETH

(Fig. 12)

*Phoxichilidium ungelatum* HEDGPETH, 1949, pp. 281-283, fig. 38; STOCK, 1954, p. 71.

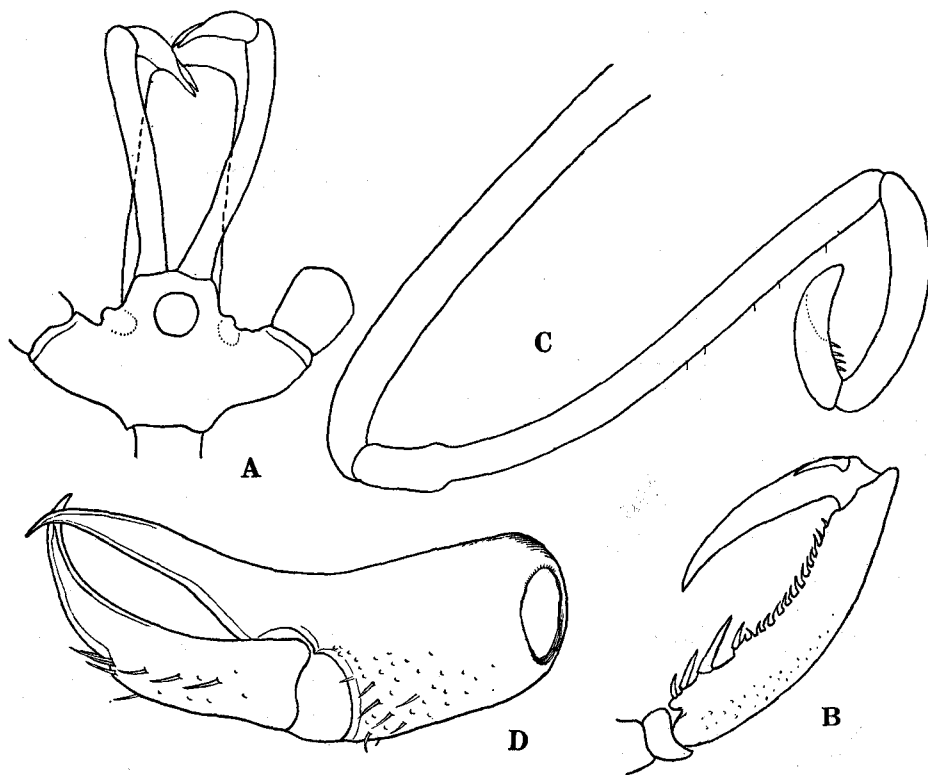


Fig. 12. *Phoxichilidium ungelatum* HEDGPETH.  
A, dorsal view of cephalic segment; B, tarsus and propodus;  
C, male oviger; D, chela. (A,  $\times 11$ ; B, C,  $\times 21$ ; D,  $\times 67$ )

*Material*: 1 female (Coll. No. 876), St. 22, off Sioya-zaki, Hukusima Pref., 539 m. June 29, 1926.

1 male (Coll. No. 878), St. 36, off Kinkazan, Miyagi Pref., 309 m. July 4, 1926.

1 male (Coll. No. 913), St. 591, off Teradomari, Niigata Pref., 311 m. Aug. 3, 1930.

*Remarks*: This species is rather slender, with a less-prolonged cephalic segment and bears a long, 5-jointed oviger, of which the third joint, with a hint of segmentation near the base, is longer than the second (but not twice of the latter). The

most remarkable characteristic is the chelae which are armed with a tuft of setae midway on the outer surface of the dactylus. A trace of palp is present as low conical knobs at the base of the first crurigers; this has been overlooked by HEDGPETH.

Previously recorded only from Japanese waters, with a wide bathymetrical range (82-587 fathoms).

# Family AMMOTHEIDAE DOHRN

## Genus *Achelia* HODGE

### 14. *Achelia superba* (LOMAN)

(Fig. 13)

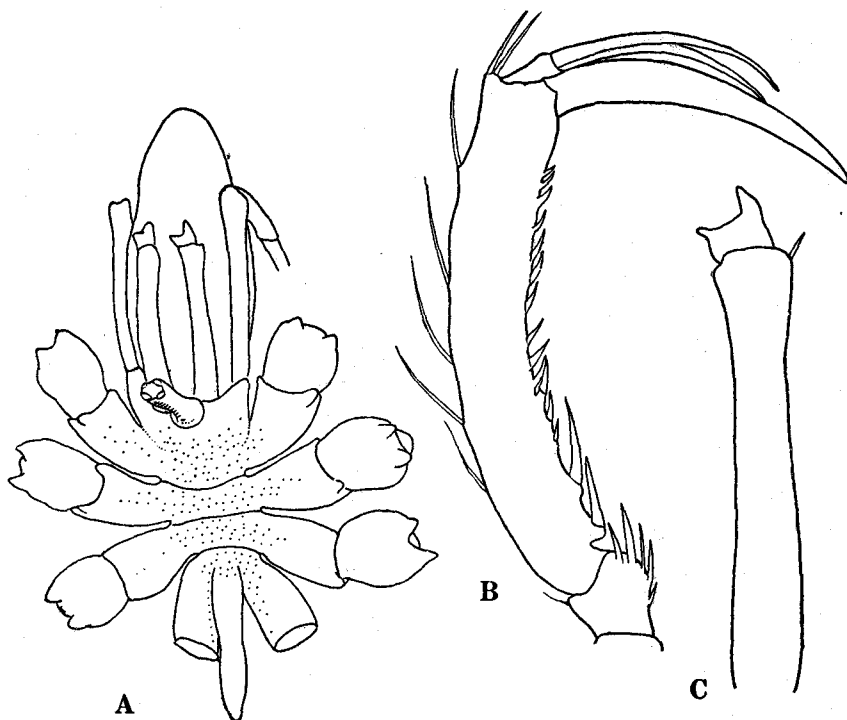


Fig. 13. *Achelia superba* (LOMAN).

A, dorsal view of trunk; B, tarsus and propodus; C, chelifore.  
(A,  $\times 21$ ; B, C,  $\times 67$ )

*Ammonothea superba* LOMAN, 1911, pp. 11-12, Pl. I figs. 14-15, Pl. II figs. 16-24; KISHIDA, 1927, p. 989, fig. 1906; OHSHIMA, 1936, p. 866 (listed); OHSHIMA and KISHIDA, 1947, p. 1008, fig. 2860.

*Achelia superba* HEDGPETH, 1949, p. 287; UTINOMI, 1951, pp. 160-161; STOCK, 1954, p. 96.

**Material:** 1 male (Coll. No. 900), St. 376, SW. of Omaé-zaki, Sizuoka Pref., 64 m. Aug. 13, 1928.



*Remarks:* This species is characterized by the long scape of chelifores, the long eye tubercle and the long abdomen. The body and legs are finely granulate. The third and fourth segments of the trunk are distinctly demarcated in the present material, instead of being fused in previous descriptions.

As all previous collecting records indicate, this species is not a real shore form.

### Genus *Ascorhynchus* G. O. SARS

#### 15. *Ascorhynchus japonicum* IVES

*Ascorhynchus japonicus* IVES, 1892, pp. 219-221, Pl. XI figs. 4-10; LOMAN, 1911, p. 5; OHSHIMA and KISHIDA, 1947, p. 1008, fig. 2859; HEDGPETH, 1949, pp. 292-293; UTINOMI, 1951, p. 166; HEDGPETH, 1954.

*A. japonicum* STOCK, 1954, pp. 126-128, figs. 61-62.

*Material:* 1 male (Coll. No. 497), St. 383, off Owase, Mie Pref., 353 m. Dec. 4, 1927.

*Remarks:* The specimen is damaged, but it measures nearly 10 mm long in trunk, 7 mm long in proboscis and 3.5 mm long in abdomen.

#### 16. *Ascorhynchus cryptopygium* ORTMANN

(Fig. 14)

*Ascorhynchus cryptopygius* ORTMANN, 1891, pp. 159-160, Pl. 24 fig. 2; LOMAN, 1911, p. 7; OHSHIMA, 1936, p. 865 (listed).

*A. cryptopygium* STOCK, 1954, p. 121, fig. 58.

*Material:* 1 specimen (Coll. No. 888), St. 236, off Suno-saki, Sagami Bay, 251 m. Nov. 6, 1927.

*Remarks:* Most of the legs and ovigers are lost, so the sex of the specimen cannot be determined. Previous records are all from Sagami Bay in 60-150 fathoms.

This less-known species is characterized by the unusually very small abdomen directed ventrally, so that it is hardly visible from above. Proboscis is 4.5 mm long and trunk 5.5 mm long, while the abdomen is only 0.6 mm long.

Chelifore: Scape 1-jointed, with a trace of chela.

Palp probably 8-jointed; distal 4 joints finely setose and the sum shorter than the preceding joint.

Oviger implantation situated on each side between the base of eye tubercle and the base of first crurigers as a low mound.

Crurigers separated by about their own diameter, each with a small tubercle at dorso-distal end.

Of the legs, tarsus is less than half as long as propodus; claw slightly arched, falciform and nearly twice of the length of propodus.

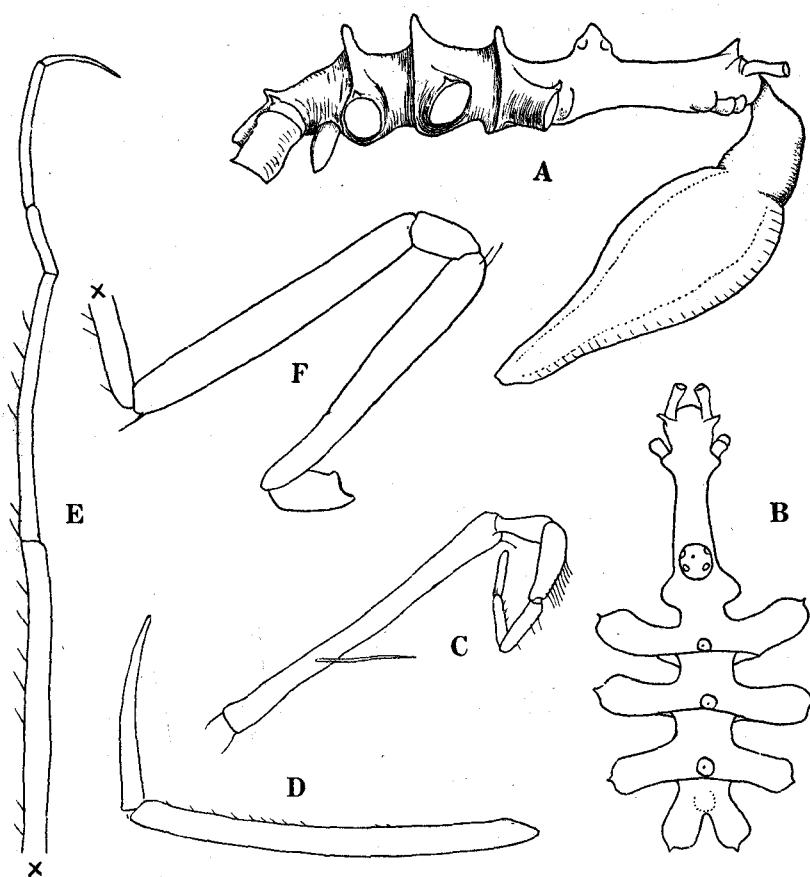


Fig. 14. *Ascorhynchus cryptopygium* ORTMANN.

A, lateral view of trunk and proboscis, legs omitted; B, dorsal view of trunk, legs omitted; C, distal joints of palp; D, propodus and claw; E-F, fourth leg. (A, B, E, F,  $\times 11$ ; C, D,  $\times 33$ )

### 17. *Ascorhynchus glabroides* ORTMANN

*Ascorhynchus glabroides* ORTMANN, 1891, pp. 160-161, Pl. 24 fig. 3a-b; OHSHIMA, 1936, p. 865 (listed), HEDGPETH, 1949, p. 293; UTINOMI, 1951, p. 166.

*A. glabrioides* LOMAN, 1911, p. 7.

**Material:** 1 specimen (Coll. No. 365), St. 293, off Sata-misaki, Kagosima Pref., 203 m. July 10, 1928.

**Remarks:** This species seems to be common in deep waters around Japan with the bathymetrical range of 72-250 m.

18. *Ascorhynchus glaberrimum* SCHIMKEWITSCH

(Fig. 15)

*Ascorhynchus glaberrimus* SCHIMKEWITSCH, 1913, pp. 242-244, Pl. 3a figs. 8-14; —, 1929, pp. 107-110, figs. 23-25; OHSHIMA, 1936, p. 865 (listed); HEDGPETH, 1949, p. 293.

*Material*: 1 female (Coll. No. 904), St. 485, E. of Misima, Yamaguti Pref., 93 m. Aug. 11, 1929.

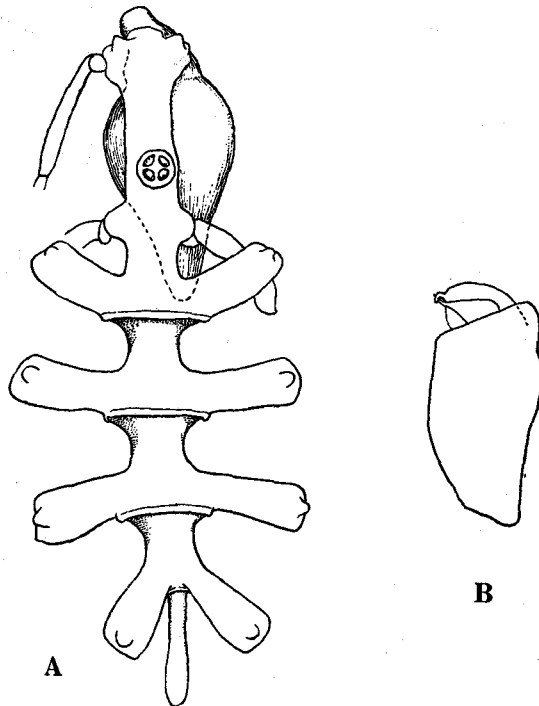


Fig. 15. *Ascorhynchus glaberrimum* SCHIMKEWITSCH.  
A, dorsal view of trunk, legs omitted; B, chelifore.  
(A,  $\times 11$ ; B,  $\times 33$ )

*Remarks*: This specimen seems to be identified with *A. glaberrimum* which is so far recorded only by the Russian author from the vicinity of Nagasaki. HEDGPETH's brief note is probably based only on this SCHIMKEWITSCH's data, not on the Albatross collection.

Although the specimen is imperfect, it measures about 4 mm long in proboscis, 8.5 mm long in trunk and 1.5 mm long in abdomen.

This little known species is distinguishable from the others by the naked dorsum of the trunk, the presence of a slight tubercle at the distal end of crurigers and the chelifore consisting of 1-jointed small scape and perfectly chelate chela.

Genus *Cilunculus* LOMAN

19. *Cilunculus armatus* (BÖHM)

(Fig. 16)

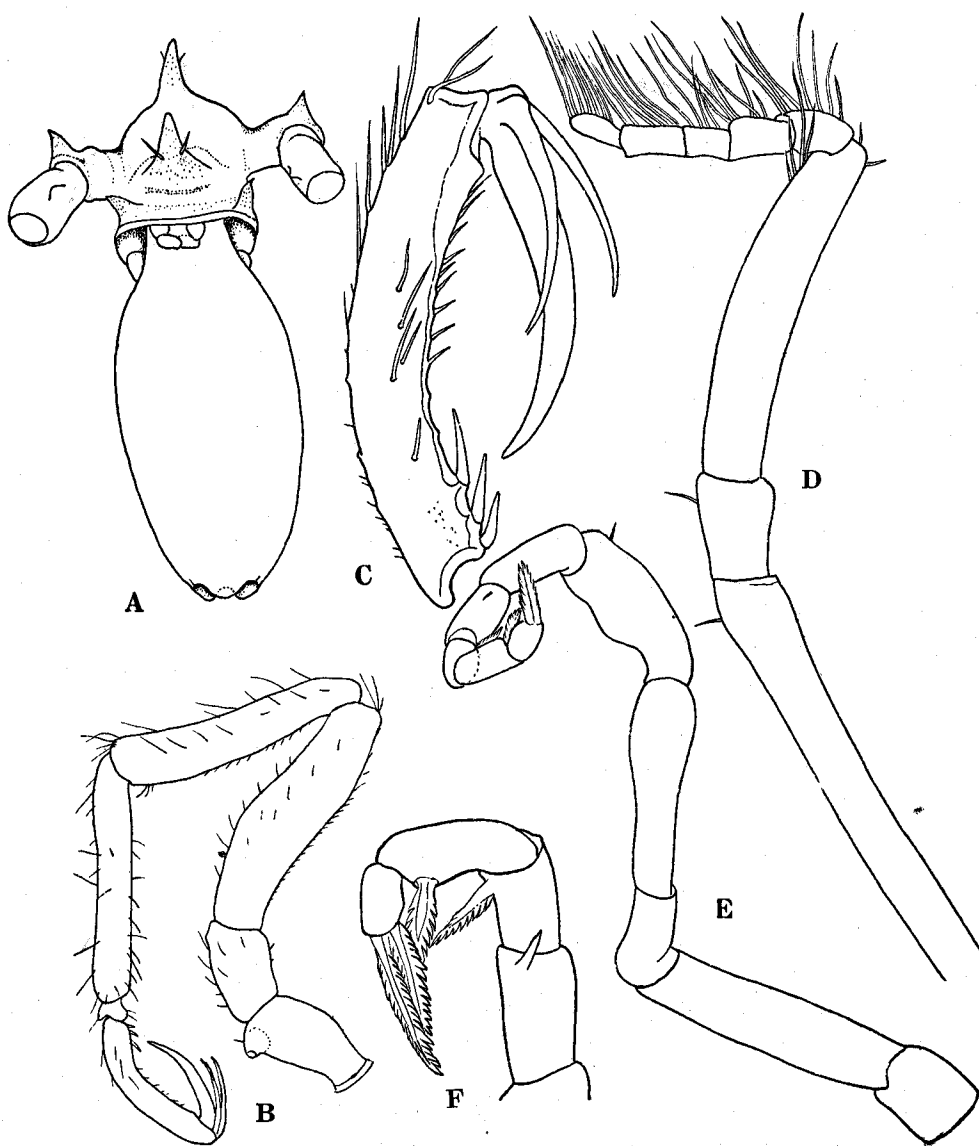


Fig. 16. *Cilunculus armatus* (BÖHM).

A, frontal view of trunk; B, fourth leg of female; C, propodus; D, palp; E, female oviger; F, distal joints of female oviger. (A, B,  $\times 18$ ; C-E,  $\times 53$ ; F,  $\times 97$ )

*Lecythorhynchus armatus* BÖHM, 1879, pp. 141-142.

*Parazetes pubescens* ORTMANN, 1891, pp. 163-164, Pl. 24 fig. 5a-d.

*Cilunculus armatus* LOMAN, 1911, pp. 9-11, Pl. I figs. 1-8; OHSHIMA, 1936, p. 866 (listed); HEDGPETH, 1949, p. 294, fig. 43.

*Cilungulus armatus* SCHIMKEWITSCH, 1929, p. LXXVI, fig. 5 A-C, pp. 81-88, figs. 18, 19 A-C, 20.

**Material:** 1 female (Coll. No. 888), St. 236, off Sunosaki, Sagami Bay, 251 m. Nov. 6, 1927.

**Remarks:** The present female specimen resembles LOMAN's drawing of the male rather than HEDGPETH's drawing of the female, in respect to the spinous processes and tubercles on the trunk and lateral processes. The ocular tubercle is provided with 2 setae instead of eyes and the dorsal tubercles, each on one segment of the trunk, are very prominent, though decreasing their size backwards. A similar but smaller tubercle (never 3 or more as in HEDGPETH's figure) is situated at the distal end of the lateral processes. These tubercles, together with a pair of frontal processes at the base of palp, are granulate on surface.

Proboscis profoundly plump, egg-shaped, distinctly notched on the ventral side of the frontal edge and directed vertically downwards.

Chelifere 2-jointed, almost naked; chela not chelate, directed inward.

Palp prominently developed, 9-jointed, distal joints densely setose.

Oviger 10-jointed. Joint 7 with a simple spine. Joint 8 and 9 with a compound spine, and joint 10 with 2 compound spines.

Legs rather setose. Coxa 2 protruded distally, where a genital pore is situated in the last pair of legs. Femur, tibia 1 and tibia 2 are subequal. Tarsus quite small. Propodus slender, curved, with 3 strong spines on sole. Claw strong, about two-thirds as long as propodus, auxiliaries also strong.

*Measurements of a female (in mm)*

|                             |     |                   |     |
|-----------------------------|-----|-------------------|-----|
| Length of proboscis .....   | 2.5 | coxa 3 .....      | 0.8 |
| Length of trunk .....       | 2.0 | femur .....       | 2.0 |
| Length of abdomen .....     | 1.3 | tibia 1 .....     | 1.9 |
| Length of oviger .....      | 2.3 | tibia 2 .....     | 1.9 |
| Diameter of proboscis ..... | 1.3 | tarsus .....      | 0.2 |
| Fourth leg :                |     | propodus .....    | 1.2 |
| coxa 1 .....                | 0.8 | claw .....        | 0.8 |
| coxa 2 .....                | 1.0 | auxiliaries ..... | 0.5 |

Genus *Heterofragilia* HEDGPETH

20. *Heterofragilia amica* STOCK

(Figs. 17 and 18)

*Heterofragilia amica* STOCK, 1954, pp. 136-139, figs. 67-68.

**Material:** 1 specimen (Coll. No. 365), St. 293, off Sata-misaki, Kagosima Pref., 203 m. July 10, 1928.

*Remarks:* This curious pycnogonid agrees in general with Stock's *Heterofragilia amica* taken from the SW. of Gotô Islands ( $32^{\circ}15' N.$ ,  $128^{\circ}12' E.$ , 90 fathoms), not far from the locality where this was obtained. Some slight disagreements are observed between the two, but they seem to me to be unimportant for specific separation.

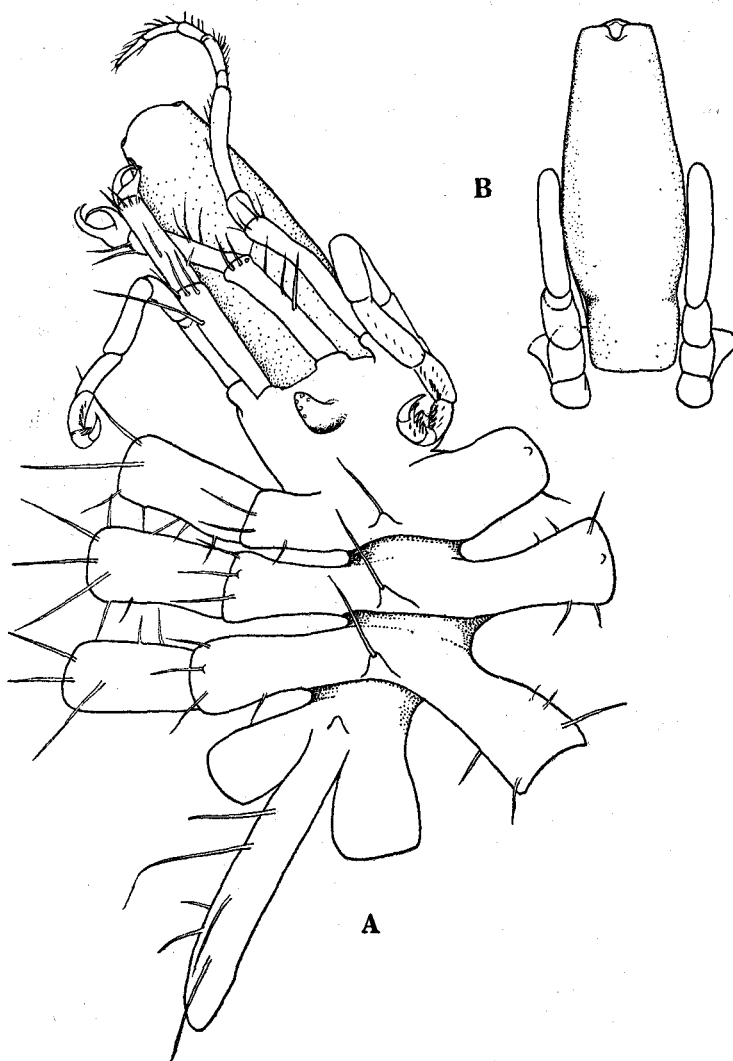


Fig. 17. *Heterofragilia amica* Stock.

A, dorsal view of trunk, legs omitted; B, ventral view of proboscis.  
(All  $\times 11$ )

Above all, the proboscis is directed forward as in the genotype *H. fimbriata* HEDGPETH (1943, 1948), instead of downward as STOCK indicates. It is not certain whether such posture is due to an artifact by fixative or intrinsic to the species. The

general outline of the proboscis is, however, quite similar; it is nearly cylindrical, with a slight constriction at about the proximal one-fourth of its length. The frontal opening is broad, and distinctly notched on its ventral side as in *H. fimbriata*, recalling somewhat the corresponding portion of the proboscis in the preceding *Cilunculus armatus*; this feature is not clear in Stock's figure.

Chelifore rather prominent, a little shorter than proboscis. Scape 2-jointed, second joint a trifle shorter than first, each bearing long setae distally and on outer margin. Chela with strongly incurved fingers, gaping when closed.

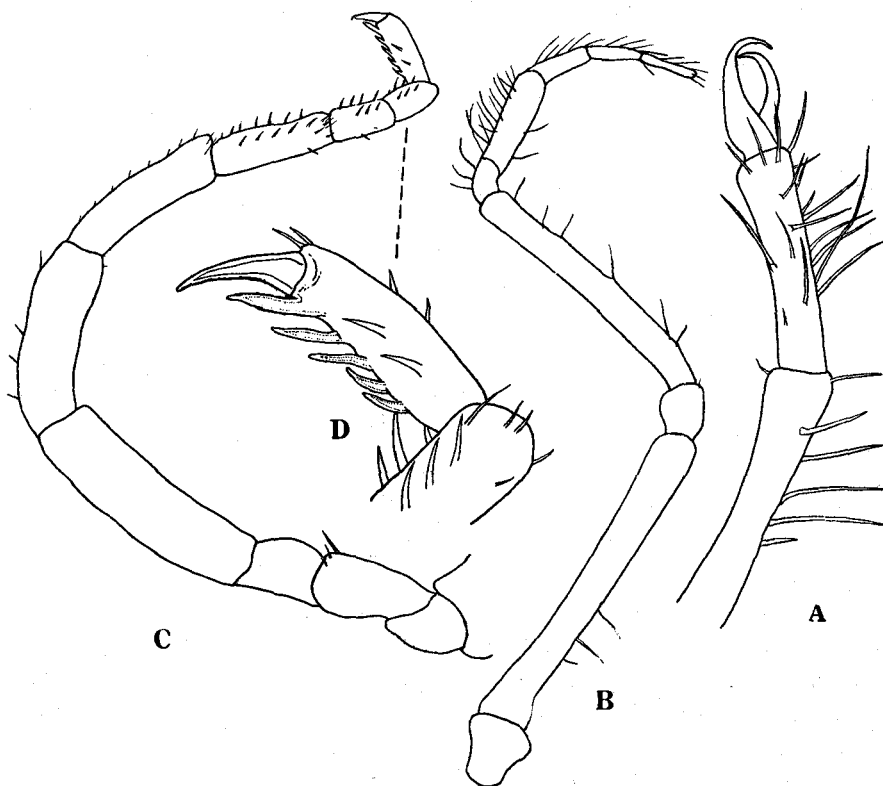


Fig. 18. *Heterofragilia amica* STOCK.

A, chelifore; B, palp; C, oviger; D, distal joints of oviger. (A-C,  $\times 21$ ; D,  $\times 67$ )

Palp 9-jointed, second joint the longest, distal 5 joints slender, with numerous setae ventrally.

Oviger 10-jointed, with short terminal claw. Seventh to tenth distal joints furnished with 3 rows of small but stiff setae or spines. On the terminal joint there are 5 stronger spines ventrally, the last one of which is the strongest. According to the formula generally adopted, the spines (or setae) are arranged as follows:

Ventral row      7:4:3:5

Lateral row      5:3:3:2

Terminal claw strong, but a trifle longer than half of the adjoining last joint.

Eye tubercle tall (about 1.4 mm long), slender, acute, provided distally with trace of setae; no eyes visible.

Conical tubercles on the dorsum of trunk, from segment 1 to 3, each bearing a seta distally, are about 0.6 mm high, whereas that on segment 4 is low, about 0.3 mm high and naked. Lateral processes and abdomen are furnished with several long setae (up to 2 mm long) on dorsal surface, especially distally in the abdomen. All the legs, except the basal coxal joints which are as long as the lateral processes, are unfortunately missing.

*Measurements of a specimen (in mm)*

|                             |     |                                  |      |
|-----------------------------|-----|----------------------------------|------|
| Length of proboscis .....   | 4.3 | Diameter of proboscis .....      | 1.47 |
| Length of trunk.....        | 5.0 | Length of 2nd lateral process... | 1.8  |
| Length of abdomen .....     | 4.0 | Length of chelifore .....        | 3.7  |
| Width between 2nd and       |     |                                  |      |
| 3rd lateral processes ..... | 1.2 |                                  |      |

Genus *Scipiolus* LOMAN

21. *Scipiolus spinosus* n. sp.

(Fig. 19)

*Material*: 1 female (Coll. No. 459—S.M.B.L. Type 160), St. 284, Seno-umi, Suruga Bay, 71 m. July 4, 1928.

*Description*: Body slender, distinctly segmented. Lateral processes widely separated by their own diameter, each armed distally with 2 prominent conical processes. Frontal edge of cephalic segment slightly protruded forward at the base of chelifores. Eye tubercle situated just between the bases of first lateral processes, bluntly pointed, with small eyes near the tip. Abdomen conical, directed upward, shorter than last pair of lateral processes, but longer than eye tubercle. Whole surface of body and appendages closely pitted, but not armed with setae.

Proboscis cylindrical, comparatively small, directed forward; its diameter about half of the own length.

Chelifore very small, naked, 2-jointed; terminal joint achelate, about one-fourth as long as scape.

Palp 9-jointed, slender, with 5 setose distal joints.

Oviger smaller than palp, 9- (or 10-) jointed. Five distal joints curved, the last one of which is armed with 2 denticulate spines, and the penultimate joint with only one.

Legs rather spinose, with prominent rounded tubercles bearing no setae. Coxa 1



armed distally with 2 conical processes like those of lateral processes and in addition one or two smaller tubercles between them. Coxa 2 with 2 tubercles subterminally on dorsal surface and a prominently projecting genital process at ventral distal end where genital pore exists. Coxa 3 shorter than coxa 2, lacking tubercles. Femur and tibia 1 subequal in length, each armed with prominent tubercles, 5 dorsodistally,

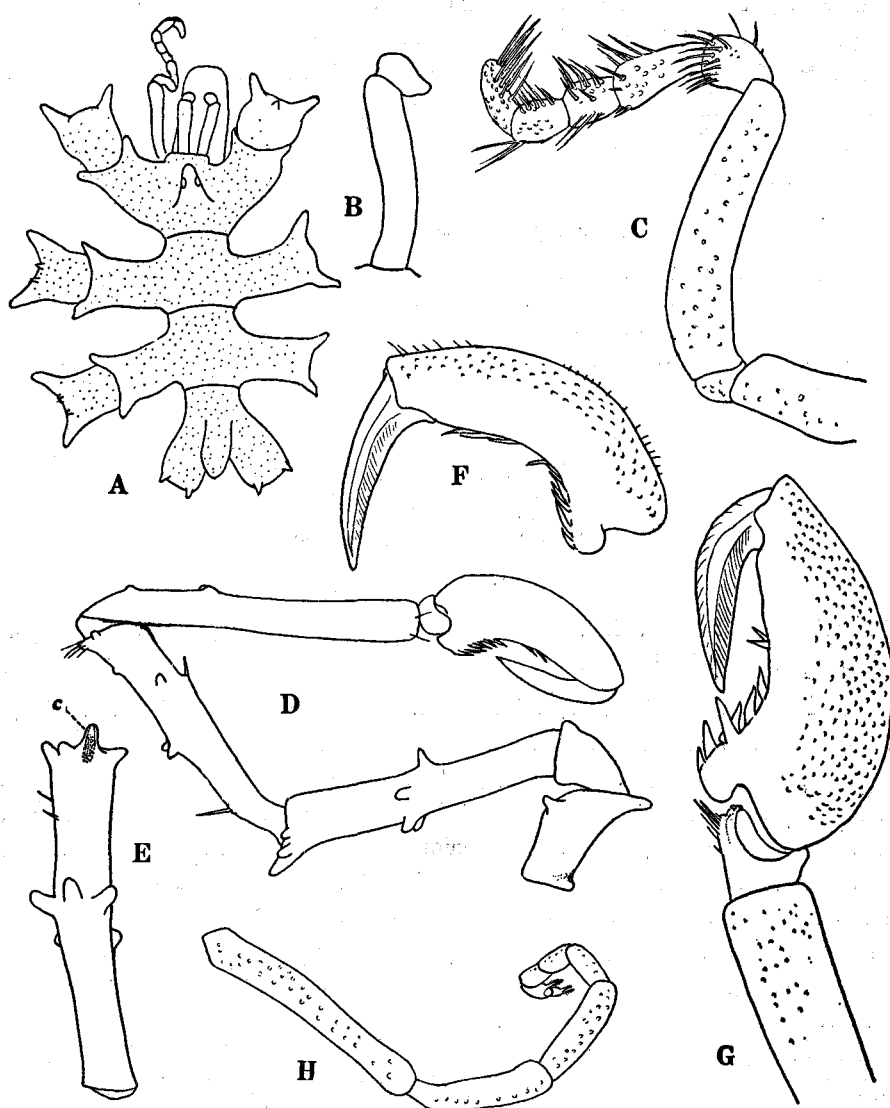


Fig. 19. *Scipiolus spinosus* n. sp.

A, dorsal view of female holotype, legs omitted; B, chelifore; C, palp; D, fourth leg; E, femur in dorsal view, showing the position of cement gland (c); F, propodus; G, distal joints of leg; H, female oviger. (A,  $\times 18$ ; D, E,  $\times 21$ ; F, G,  $\times 33$ ; B, C, H,  $\times 53$ )

2 or 3 about midway on dorsal surface, 1 about midway on each lateral surface and 1 about midway on ventral surface. Tibia 2 the longest of all joints and with 2 smaller tubercles on dorsal surface near the proximal end. Besides, a few simple setae are scattered.

Tarsus the smallest, densely setose ventrally. Propodus curved, stout, with a distinct heel bearing a row of strong spines smaller distally. Terminal claw heavy, about two-thirds as long as propodus; auxiliaries lacking.

Cement gland opens to the central dorso-distal tubercle on femur.

*Measurements of the holotype (in mm)*

|                                 |      |                |      |
|---------------------------------|------|----------------|------|
| Length of proboscis .....       | 0.8  | Fourth leg :   |      |
| Length of trunk .....           | 2.5  | coxa 1 .....   | 0.4  |
| Width between 2nd and           |      | coxa 2 .....   | 0.7  |
| 3rd lateral processes .....     | 0.47 | coxa 3 .....   | 0.6  |
| Length of abdomen .....         | 0.6  | femur .....    | 2.0  |
| Length of chelifore .....       | 0.5  | tibia 1 .....  | 2.0  |
| Length of palp .....            | 2.0  | tibia 2 .....  | 3.0  |
| Length of lateral process ..... | 0.6  | tarsus .....   | 0.2  |
|                                 |      | propodus ..... | 1.5  |
|                                 |      | claw .....     | 0.65 |

*Remarks:* This new species is referable to the unique genus *Scipiolus* which has long been considered as monotypic. The genotype *S. plumosus* LOMAN (1908, p. 58) was only once recorded from Kei Islands in the East Indies based on a single specimen of female. Both are closely related in the general structure, especially in the dwarf proboscis, the achelate small chelifore, the diminutive oviger with a few denticulate spines and the inconspicuous cephalic prolongation. But, the present Japanese form cannot be assigned to *S. plumosus* in the more spinous armature of the lateral processes and legs, in the lack of plumose setae in the legs and in the shape of the propodus.

In several structural details, this genus is close to the genera *Lecythorhynchus* and *Achelia*, so that it should be included in the Ammotheidae.

## Family COLOSSENDEIDAE HOEK

### Genus *Colossendeis* JARZYNSKY

#### 22. *Colossendeis dofleini* LOMAN

*Colossendeis dofleini* LOMAN, 1911, pp. 4-5, Pl. I figs. 9-13; OHSHIMA, 1936, p. 867 (listed); HEDGPETH, 1949, p. 300, fig. 47 a-d; UTINOMI, 1951, p. 167.

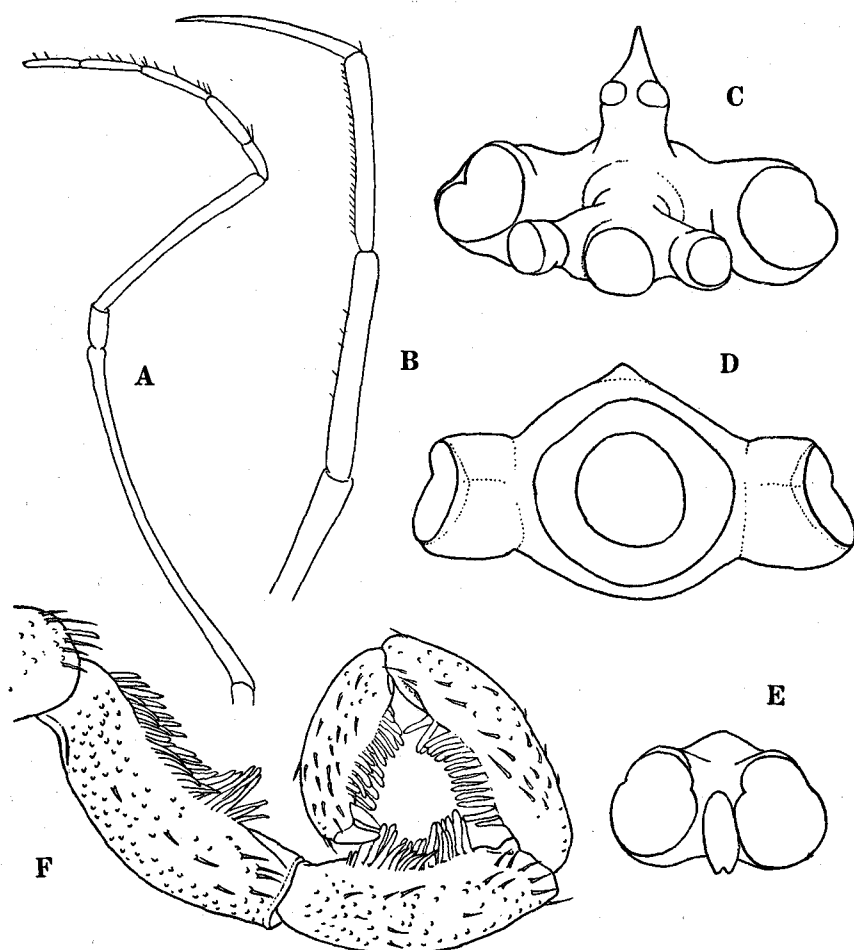
*Material:* 5 specimens (Coll. No. 365), St. 293, off Sata-misaki, Kagosima Pref., 203 m. July 10, 1928.

1 specimen (Coll. No. 915), St. 599, N. of Sado Island, 181 m. Aug. 9, 1930.

23. *Colossendeis chitinos* HILTON

(Fig. 20)

*Colossendeis chitinos* HILTON, 1943, p. 4; HEDGPETH, 1949, p. 301, fig. 47e-h; STOCK, 1954, p. 161, fig. 79.

Fig. 20. *Colossendeis chitinos* HILTON.

A, palp; B, distal joints of leg; C, cephalic segment in front view; D, third segment of trunk in front view; E, fourth segment of trunk with abdomen, viewed from behind; F, distal joints of oviger. (A, B,  $\times 11$ ; C-E,  $\times 21$ ; F,  $\times 67$ )

*Material*: 1 damaged specimen (Coll. No. ?), St. 223, Tosa Bay, Kôti Pref., 311 m. July 20, 1927.

1 specimen (Coll. No. 903), St. 469, Okinosima, Tusima Strait, 112 m. July 25, 1929.

1 specimen (Coll. No. 906), St. 549, off Etizen-saki, N. of Wakasa Bay, Hukui Pref., 115 m. July 20, 1930.

1 specimen (Coll. No. 909), St. 568, N. of Noto Peninsula, Isikawa Pref., 90 m. July 27, 1930.

18 specimens (Coll. No. 905), St. 572, N. of Noto Peninsula, Isikawa Pref., 132 m. July 27, 1930.

7 specimens (Coll. No. 924), St. 645, W. of Tugaru Strait, 115 m. Aug. 22, 1930.

*Remarks:* This species resembles the preceding *C. dofleini* in superficial appearance, but differs from the latter in the very small abdomen directed ventrally, in the more sharply pointed dorsal tubercles and in the subchelate structure of the end of ovigers. The distal joints of ovigers are exceedingly setose; this seems to be one of the characteristics in this species.

*Measurements of a male from St. 572 (in mm)*

|                           |      |                |      |
|---------------------------|------|----------------|------|
| Length of proboscis ..... | 6.5  | Third leg :    |      |
| Length of trunk .....     | 4.0  | coxa 1-3 ..... | 2.5  |
| Length of abdomen .....   | 0.2  | femur .....    | 9.0  |
| Length of palp .....      | 10.0 | tibia 1 .....  | 10.0 |
|                           |      | tibia 2 .....  | 8.0  |
|                           |      | tarsus .....   | 2.8  |
|                           |      | propodus ..... | 2.4  |
|                           |      | claw .....     | 1.8  |

## 24. *Colossendeis nasuta* HEDGPETH

(Fig. 21)

*Colossendeis nasuta* HEDGPETH, 1949, pp. 302-303, fig. 46e-h.

*Material:* 1 male (Coll. No. 880), St. 67, off Hatinoe, Aomori Pref., 519 m. July 25, 1926.

*Remarks:* The material agrees in general with HEDGPETH's description, but differs slightly in minor details.

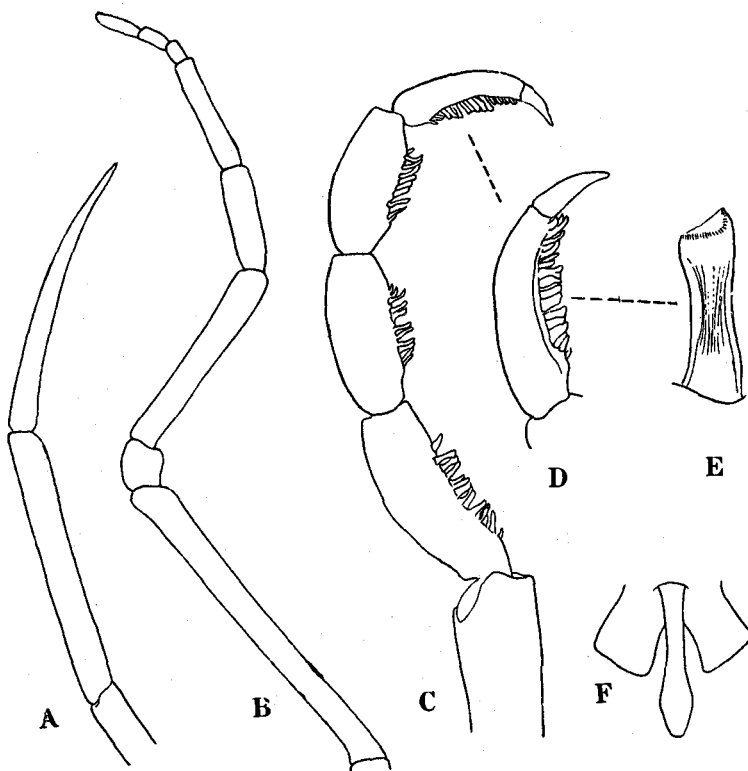
Trunk elongate, unsegmented, lateral processes separated by their own diameter. Eye tubercle conical, erect, pointed at tip, with 4 indistinct eyes. Abdomen clavate, slender in the middle, longer than last pair of crurigers. All surface of trunk and legs glabrous.

Proboscis cylindrical as in *C. japonica*, but not so tapering distally as in the type. Palp 9-jointed, second joint about twice as long as fourth and fifth joint slightly shorter than sixth.

Terminal joints of oviger strongly curved, bearing 2 (instead of several) rows of rather long, ligulate spines which are usually upturned at tip and very finely serrate marginally. Last joint slender and gradually tapering, with a terminal claw about one-third as long as the joint itself.

*Measurements of a male (in mm)*

|                           |          |                |      |
|---------------------------|----------|----------------|------|
| Length of proboscis ..... | 7.5      | Third leg:     |      |
| Length of trunk .....     | 6.0      | coxa 1-3 ..... | 3.7  |
| Length of abdomen .....   | 1.5      | femur .....    | 12.0 |
| Length of palp .....      | ca. 11.0 | tibia 1 .....  | 11.0 |
|                           |          | tibia 2 .....  | 7.0  |
|                           |          | tarsus .....   | 3.0  |
|                           |          | propodus ..... | 2.8  |
|                           |          | claw .....     | 3.0  |

Fig. 21. *Colossendeis nasuta* HEDGPETH.

A, end of leg; B, palp; C, distal joints of male oviger; D, end of oviger; E, ligulate spine of oviger; F, abdomen. (A, B,  $\times 11$ ; F,  $\times 13$ ; C,  $\times 21$ ; D,  $\times 33$ ; E,  $\times 150$ )

## Family PYCNOGONIDAE WILSON

Genus *Pycnogonum* BRÜNNICH25. *Pycnogonum tenue* (SLATER) KISHIDA

(Figs. 22 and 23)

*Pycnogonum littorale* var. *tenu* SLATER, 1879, p. 283; ORTMANN, 1891, p. 167; SCHIMKEWITSCH, 1929, pp. 15-18.

*P. tenue* KISHIDA, 1927, p. 989, fig. 1905; OHSHIMA, 1933, p. 149; OHSHIMA, 1936, p. 867 (listed); OHSHIMA and KISHIDA, 1947, p. 1010, fig. 2865; HEDGPETH, 1949, p. 303, figs. 48 b, 50 c-d; STOCK, 1954, pp. 162-165, fig. 80.

*Material*: 1 female (Coll. No. 885), St. 215, W. of Kii Channel, 251 m. July 18, 1927.

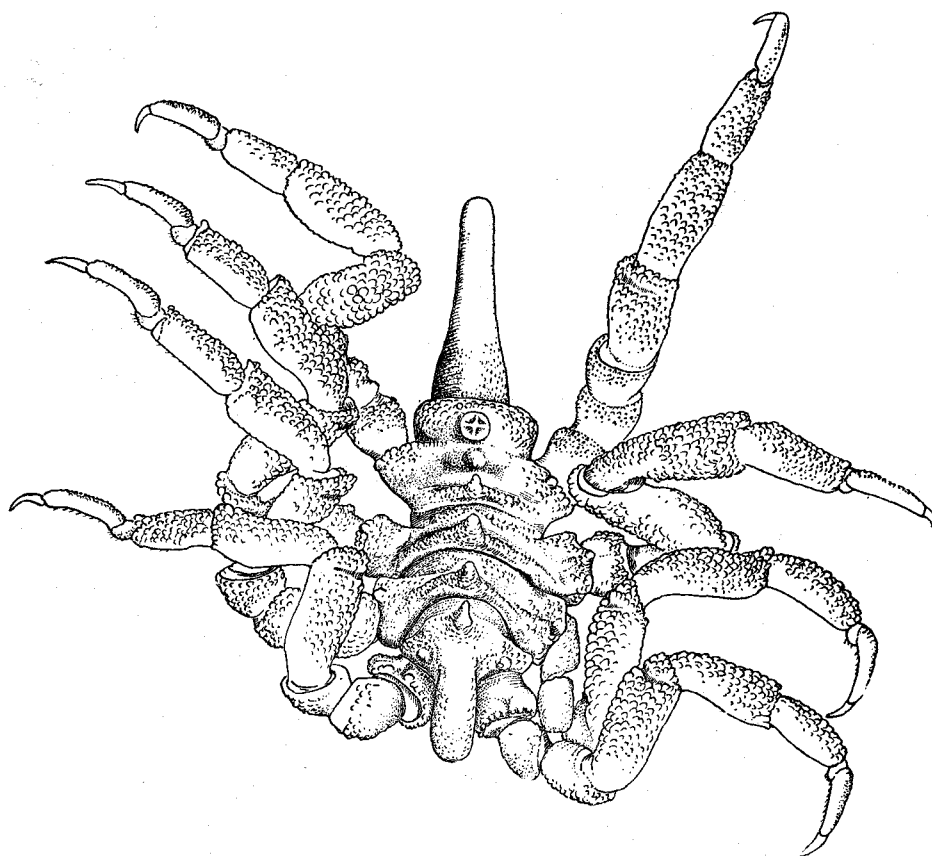


Fig. 22. *Pycnogonum tenue* (SLATER) KISHIDA.  
Dorsal view of female. ( $\times 11$ )

*Remarks*: This little known species, presumably endemic to Japanese deep waters, was first figured by KISHIDA (1927), with an outline of a protonymphon larva and a brief diagnosis of the species, first placing into the specific rank; later the same was reproduced in 1947 as it is, without amendment by Dr. H. OHSHIMA.

In his brief note appended to the figure, however, it is regrettable to find two apparent errors that may mislead one for identification. A note, that is "Eye tubercle

is pretty tall and pointed at tip", is not true; it is nothing but a low cone with 4 distinct eyes. Another note, that is "2 auxiliary claws present", is also incredible.

The most satisfactory description and figures of this species is those of Strock (1954). Therefore it seems to me to be needless to add much to his excellent work, but it may not be so superfluous to give here some figures and dimensions of the present material.

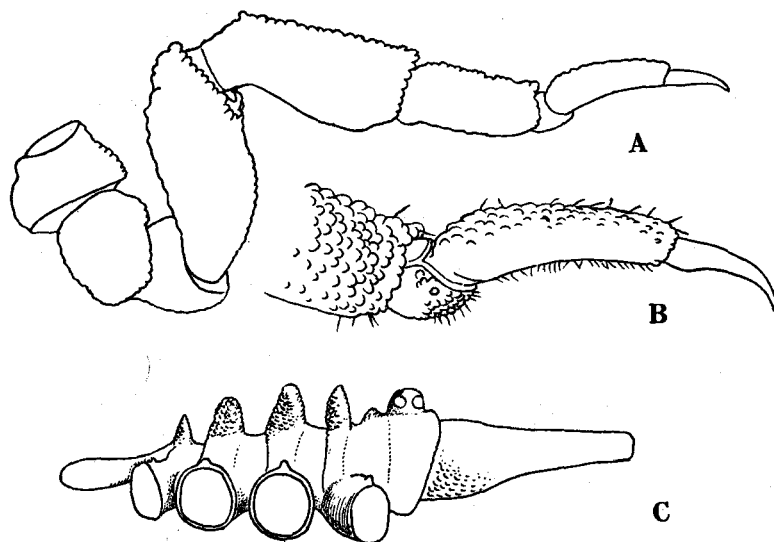


Fig. 23. *Pycnogonum tenue* (SLATER) KISHIDA.

A, third leg, granulated structure omitted; B, end of third leg; C, lateral view of trunk, showing the arrangement of tubercles on dorsum. (C,  $\times 11$ ; A,  $\times 18$ ; B,  $\times 33$ )

*Measurements of a female (in mm)*

|                                   |     |                |      |
|-----------------------------------|-----|----------------|------|
| Length of proboscis .....         | 2.0 | Third leg:     |      |
| Diameter of proboscis at base...  | 0.7 | coxa 1 .....   | 0.5  |
| Length of trunk .....             | 3.4 | coxa 2 .....   | 0.7  |
| Width across 2nd crurigers .....  | 2.7 | coxa 3 .....   | 0.55 |
| Length of abdomen .....           | 1.0 | femur .....    | 1.7  |
| Height of 3rd dorsal tubercle ... | 0.4 | tibia 1 .....  | 1.4  |
|                                   |     | tibia 2 .....  | 0.9  |
|                                   |     | tarsus .....   | 0.3  |
|                                   |     | propodus ..... | 0.9  |
|                                   |     | claw .....     | 0.48 |

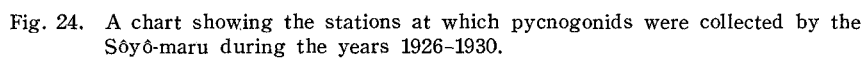




Table 2. List of stations at which pycnogonids were collected by the Sôyô-maru, during the years 1926-1930.

| Station No. | Date         | Locality  |            | Depth (m) | Bottom water temp. (C°) | Bottom character | Pycnogonids collected   |
|-------------|--------------|-----------|------------|-----------|-------------------------|------------------|---|
|             |              | Lat. N.   | Long. E.   |           |                         |                  |   |
| 22          | 1926 June 29 | 30°46'40" | 141°30'00" | 539       | 4.0                     | m. S             | <i>Phoxichilidium ungelatum</i>   |
| 36          | July 4       | 38°17'15" | 141°56'30" | 309       | 3.4                     | Cy               | <i>Phoxichilidium ungelatum</i>   |
| 57          | July 18      | 39°44'36" | 142°18'10" | 494       | 2.9                     | m. S             | <i>Nymphon braschnikowi</i>   |
| 67          | July 25      | 40°36'35" | 142°10'40" | 519       | 3.6                     | s. M             | <i>Colossendeis nasuta</i>  |
| 215         | 1927 July 18 | 33°32'20" | 134°32'00" | 251       | 13.6                    | M                | <i>Pycnogonum tenue</i>   |
| 223         | July 20      | 33°13'50" | 133°38'40" | 311       | 9.8                     | —                | <i>Colossendeis chitinoso</i>   |
| 232         | July 30      | 33°02'00" | 134°48'25" | 269       | 16.3                    | R                | <i>Nymphon japonicum</i>  |
| 236         | Nov. 6       | 35°02'00" | 139°46'00" | 251       | 12.9                    | G                | <i>Ascorhynchus cryptopygium</i><br><i>Cilunculus armatus</i>   |
| 239         | Nov. 6       | 35°06'00" | 139°39'10" | 307       | 12.3                    | S, St            | <i>Nymphon japonicum</i>  |
| 255         | Nov. 10      | 34°46'15" | 139°05'00" | 263       | 13.5                    | G, m. S, Sh      | <i>Nymphon japonicum</i>  |
| 258         | Nov. 15      | 34°32'50" | 138°45'30" | 432       | 6.6                     | C                | <i>Nymphon japonicum</i>  |
| 259         | Nov. 15      | 34°41'15" | 138°43'00" | 188       | 12.0                    | s. M             | <i>Nymphon japonicum</i>  |
| 269         | Nov. 18      | 34°36'40" | 139°00'40" | 247       | 11.2                    | G                | <i>Nymphon grossipes</i>  |
| 270         | Nov. 18      | 34°59'00" | 139°33'40" | 91        | 16.5                    | C, G             | <i>Nymphon japonicum</i>  |
| 278         | 1928 July 2  | 34°42'50" | 138°30'30" | 79        | 14.8                    | Cy, G, M         | <i>Pallenopsis sibogae</i>  |
| 279         | July 2       | 34°42'10" | 138°30'40" | 155       | 12.3                    | G, S, Sh         | <i>Nymphon japonicum</i>  |
| 284         | July 4       | 34°38'30" | 138°26'30" | 71        | 10.0                    | G, P             | <i>Scipiolus spinosus</i>   |
| 286         | July 4       | 34°36'10" | 138°26'30" | 123       | 14.3                    | s. M             | <i>Nymphon japonicum</i>  |
| 293         | July 10      | 30°45'00" | 130°40'40" | 203       | 14.3                    | G, P             | <i>Nymphon japonicum</i><br><i>Ascorhynchus glabroides</i><br><i>Heterofragilia amica</i><br><i>Colossendeis dofleini</i><br><i>Achelia superba</i> |
| 315         | July 15      | 32°15'35" | 131°50'05" | 421       | 7.2                     | R                | <i>Achelia superba</i>  |
| 383         | 1927 Dec. 4  | 33°57'15" | 136°22'45" | 353       | —                       | —                | <i>Ascorhynchus japonicum</i>   |
| 435         | 1929 July 18 | 32°10'00" | 128°46'45" | 324       | 11.0                    | S, R             | <i>Nymphon stocki</i>   |
| 468         | July 25      | 34°25'40" | 129°47'00" | 112       | 16.1                    | M, S             | <i>Parapallene nierstraszi</i>  |
| 469         | July 25      | 34°09'10" | 130°07'00" | 91        | 18.5                    | c. S, R          | <i>Colossendeis chitinoso</i>   |
| 485         | Aug. 11      | 34°53'00" | 131°18'40" | 93        | 21.1                    | S                | <i>Ascorhynchus glaberrimum</i>   |
| 549         | 1930 July 20 | 36°13'00" | 135°42'30" | 115       | 15.6                    | R                | <i>Colossendeis chitinoso</i>   |
| 553         | July 21      | 36°35'15" | 136°17'00" | 113       | 18.0                    | s. M             | <i>Nymphon japonicum</i>  |
| 558         | July 22      | 36°13'00" | 136°28'42" | 188       | 11.0                    | M                | <i>Nymphon soyoi</i>  |
| 568         | July 27      | 37°47'05" | 136°50'15" | 90        | 19.3                    | R                | <i>Nymphon japonicum</i><br><i>Colossendeis chitinoso</i>   |
| 572         | July 27      | 37°52'55" | 137°00'45" | 132       | 16.8                    | R                | <i>Nymphon stocki</i><br><i>Colossendeis chitinoso</i>  |
| 575         | July 28      | 37°48'00" | 137°18'00" | 123       | 16.8                    | S                | <i>Nymphon japonicum</i>  |
| 591         | Aug. 3       | 37°27'45" | 138°20'50" | 311       | 2.0                     | R                | <i>Phoxichilidium ungelatum</i>   |
| 599         | Aug. 9       | 38°18'23" | 138°21'55" | 181       | 12.1                    | m. S             | <i>Colossendeis dofleini</i>  |
| 610         | Aug. 10      | 38°52'33" | 139°02'50" | 145       | 11.9                    | R                | <i>Nymphon japonicum</i>  |
| 618         | Aug. 14      | 39°07'30" | 139°30'45" | 135       | 3.1                     | R, Sh            | <i>Nymphon japonicum</i>  |
| 630         | Aug. 17      | 39°52'45" | 139°34'00" | 150       | 11.3                    | R                | <i>Nymphon kodanii</i>  |
| 638         | Aug. 18      | 40°31'15" | 139°30'45" | 73        | 16.6                    | R                | <i>Nymphon japonicum</i>  |
| 645         | Aug. 22      | 41°06'17" | 140°09'15" | 115       | 14.4                    | m. S, Sh         | <i>Nymphon micropedes</i><br><i>Colossendeis chitinoso</i>  |
| 647         | Aug. 23      | 41°07'30" | 140°03'00" | 86        | 18.2                    | R                | <i>Nymphon micropedes</i>   |
| 653         | Aug. 24      | 41°39'15" | 140°39'45" | 108       | 14.7                    | S                | <i>Nymphon ortmanni</i>   |
| 658         | Aug. 30      | 41°39'00" | 141°33'27" | 113       | 16.3                    | R                | <i>Nymphon micropedes</i>   |

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